Nakamichi

Service Manual

Nakamichi

ST-7
ST-7E

AM/FM Stereo Tuner

CONTENTS

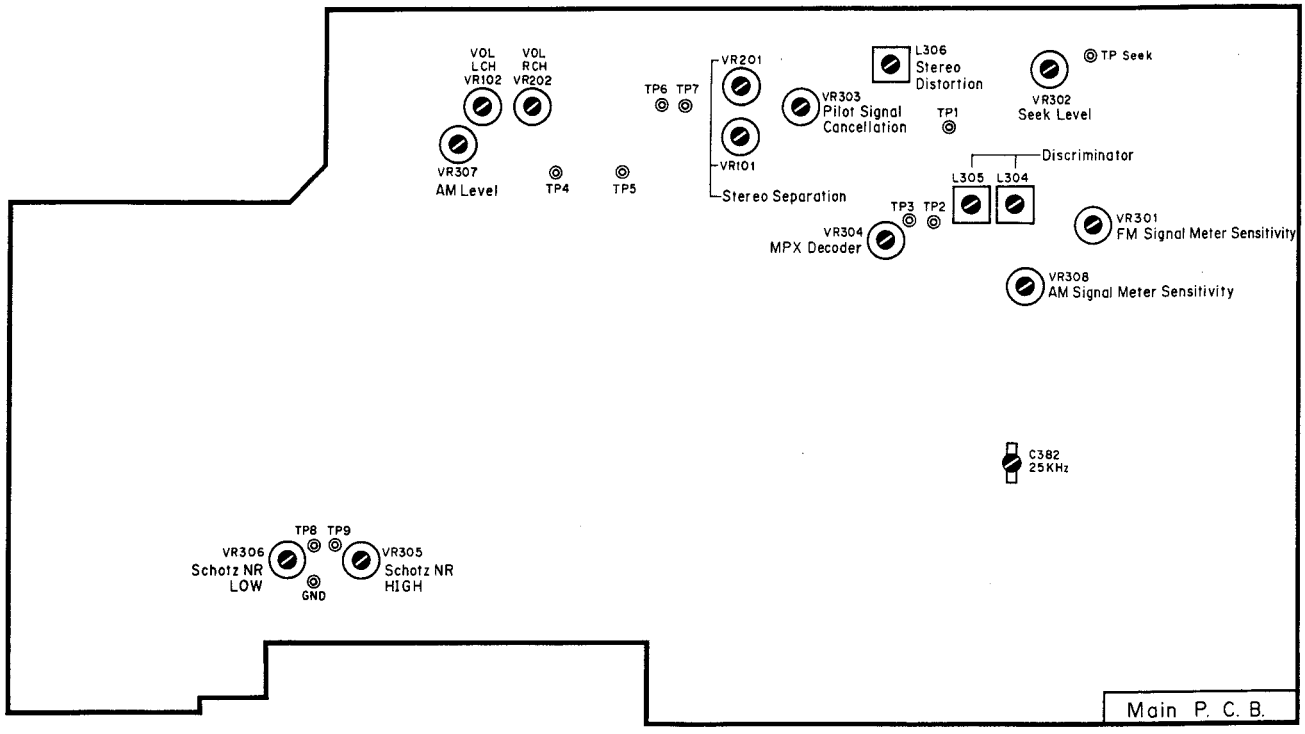
1. General 1
2. Parts Location for Electrical Adjustment 2
3. Electrical Adjustment 3
   3. 1. FM Adjustment 3
   3. 2. AM Adjustment 5
4 Mechanism Ass'y and Parts List 6
   4. 1. Synthesis 6
   4. 2. Front Panel Ass'y (A01) 7
   4. 3. Chassis Ass'y (A02) 8
   4. 4. Rear Panel Ass'y (B01) 9
5. Mounting Diagrams and Parts List 10
   5. 1. Power Switch P.C.B. Ass'y 10
   5. 2. Antenna P.C.B. Ass'y 10
   5. 3. Memory Switch P.C.B. Ass'y 11
   5. 4. Function Switch P.C.B. Ass'y 11
   5. 5. Pin Jack P.C.B. Ass'y 12
   5. 6. Display P.C.B. Ass'y 12
   5. 7. AM P.C.B. Ass'y 13
   5. 8. Main P.C.B. Ass'y 14
6. Schematic Diagram 15
   6. 1. IC Block Diagrams 15
   6. 2. Schematic Diagram 18
7. Wiring Diagram 19
8. Block Diagram 20
9. Specifications 21

1. GENERAL

1.1. Packing Materials, Owner's Manual, and Auxiliary Parts

Part No.	Description	Q'ty
0F03865A	Carton Box ST-7	1
0F03866B	Carton Box ST-7E	1
0F03863A	Packing L	1
0F03864A	Packing R	1
0D04527A	Owner's Manual (English)	1
0D04526A	Owner's Manual (English/German/French)	1
0B90069A	AM Loop Antenna	1
0B90070A	AM Loop Antenna Holder for wall mounting	1

2. PARTS LOCATION FOR ELECTRICAL ADJUSTMENT



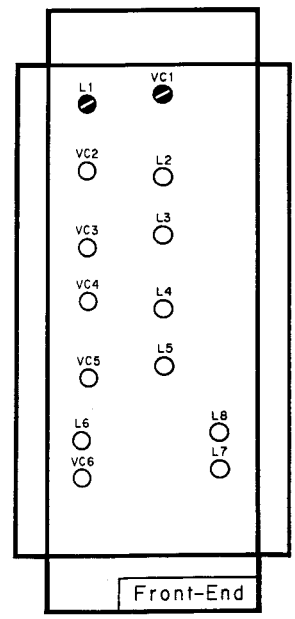


Fig. 2

3. ELECTRICAL ADJUSTMENT

Note: Adjustment should be made in a shielded room in principle.

3.1. FM Adjustment

STEP	ITEM	OUTPUT CONNECTION	MODE	ADJUST-MENT	REMARKS
1	Preliminary Step				1. Connect an FM Generator to the FM Antenna Input Terminal of the ST-7/ ST-7E. 2. Set the FM Generator as follows (either Stereo or Mono mode): The FM Generator should be set as follows unless otherwise specified. o Stereo Frequency: 93 MHz Modulation: ST-7 (U.S.A. & Canada) Audio -- 1 kHz 90% Pilot -- 19 kHz 10% (1 kHz signal: L=-R) ST-7 (Australia) & ST-7E Audio -- 1 kHz 50% Pilot -- 19 kHz 10% (1 kHz signal: L=-R) RF Level: 65 dBf o Mono Frequency: 93 MHz Modulation: ST-7 (U.S.A. & Canada) Audio -- 1 kHz 100% ST-7 (Australia) & ST-7E Audio -- 1 kHz 60% RF Level: 65 dBf 3. Set the Output Level controls on the rear panel at maximum.
2	25 kHz Adjustment	Frequency Counter to Pin 24 of IC310 (TC9147BP) on Main P.C.B.		Main P.C.B. C382	1. Short pins 36 and 41 of IC310 (TC9147BP) on the Main P.C.B. Ass'y. 2. Adjust trimmer capacitor C382 to obtain 25000.5 Hz +0.4/-0.5 Hz on the frequency counter. 3. Remove short between pins 36 and 41 of IC310.
3	Monophonic Sensitivity Adjustment	Oscilloscope, VTVM and Distortion Meter to Output Jacks	FM Generator Mono ST-7/ST-7E FM Mute - OFF Seek Level - 20 dBf Mode - ST Meter - Signal Schotz NR - OFF	FM Front-end L1, VC1	1. Set the frequency of the FM Generator to 90 MHz and tune the ST-7/ST-7E. 2. Turn L1 to obtain minimum distortion and maximum output level. 3. Decrease the RF Level of the FM Generator and repeat above 2 to perform precise adjustment. 4. Set the frequency of the FM Generator to 106 MHz and tune the ST-7/ST-7E. 5. Adjust VC1 to obtain minimum distortion and maximum output level. 6. Decrease the RF level and repeat above 5 to perform precise adjustment. 7. Repeat above 2 to 6 two or three times. Note: Do not turn other coils or trimmer capacitors on the Front-end. However, if distortion is not small enough, finely adjust L2 - L5 and VC2 - VC5 on the Front-end till satisfactory result is obtained. (Set the frequency to 90 MHz for adjusting L2 - L5 and to 106 MHz for VC2 - VC5.)

STEP	ITEM	OUTPUT CONNECTION	MODE	ADJUST-MENT	REMARKS
4	Discriminator Alignment	DC Voltmeter across TP1 and TP2, and Distortion Meter to Output Jack	FM Generator Mono ST-7/ST-7E FM Mute - OFF Seek Level - 20 dBf Mode - ST Meter - Signal Schotz NR - OFF	Main P.C.B. L304, L305	1. Adjust L304 to obtain 0 V ±20 mV on the DC voltmeter. 2. Adjust L305 to obtain minimum distortion. 3. Repeat above 1 and 2 two or three times.
5	MPX Decoder Adjustment	Frequency Counter to TP3	FM Generator Stereo ST-7/ST-7E Same as above	Main P.C.B. VR304	1. Cut the 1 kHz audio signals of the FM Generator to provide only 19 kHz pilot signal. 2. Adjust VR304 to obtain 76 kHz ±50 Hz on the frequency counter.
6	Pilot Signal Cancellation Adjustment	Oscilloscope across TP6 and TP7	FM Generator Stereo ST-7/ST-7E FM Mute - ON Seek Level - 20 dBf Mode - ST Meter - Signal Schotz NR - OFF	Main P.C.B. VR303	1. Cut the 1 kHz audio signals of the FM Generator to provide only 19 kHz pilot signal. 2. Adjust VR303 so that the waveform on the oscilloscope is minimized in amplitude.
7	Stereo Distortion Adjustment	Distortion Meter and VTVM to Output Jacks	FM Generator Stereo ST-7/ST-7E Same as above	Main P.C.B. L306	With decreasing the RF level of the FM Generator gradually, adjust L306 (yellow top) to obtain minimum distortion and maximum output level on both channels.
8	Level Adjustment	VTVM to TP4, TP5	FM Generator Mono ST-7/ST-7E Same as above	Main P.C.B. VR102 VR202	Adjust VR102 (VR202) to obtain 550 mV on the VTVM.
9	Stereo Separation Adjustment	VTVM to Output Jack	FM Generator Stereo ST-7/ST-7E Same as above	Main P.C.B. VR101 VR201	1. Cut the R channel 1 kHz audio signal of the FM Generator to provide only L channel signal. Adjust VR201 to obtain minimum R channel output level on the VTVM. 2. Cut the L channel 1 kHz audio signal to provide only R channel signal. Adjust VR101 to obtain minimum L channel output level on the VTVM.
10	FM Signal Meter Sensitivity Adjustment	None	FM Generator Mono ST-7/ST-7E Same as above	Main P.C.B. VR301	1. Set the RF level of the FM Generator to 69 dBf. 2. Adjust VR301 so that all figures (1 - 5) on the Signal Meter light up.

STEP	ITEM	OUTPUT CONNECTION	MODE	ADJUST-MENT	REMARKS
11	Seek Level Adjustment	None	FM Generator Stereo ST-7/ST-7E FM Mute - ON Seek Level - 40 dBf/20 dBf Mode - ST Meter - Signal Schotz NR - OFF	Main P.C.B. VR302	1. Connect TPseek (the pin with yellow wire by VR302) to GND. 2. Turn VR302 counterclockwise until the Lock Indicator on the FM/AM Indicator goes out. 3. Slowly turn VR302 clockwise to find the position where the Lock Indicator starts illuminating. 4. Remove GND of TPseek. 5. Press the Seek button to check for accurate seek operation for the RF level range of the FM Generator from 38 to 42 dBf. If satisfactory results are not obtained repeat above 1 through 5. Note: Turning VR302 clockwise causes the seek operation to be stopped in lower RF level.
12	Schotz NR Adjustment	Oscilloscope to TP8, TP9	FM Generator Stereo ST-7/ST-7E FM Mute - ON Seek Level - 20 dBf Mode - ST Meter - Signal Schotz NR - ON/OFF	Main P.C.B. VR305 VR306	1. Set the RF level of the FM Generator to 59 dBf and cut the R channel 1 kHz audio signal. 2. Set the oscilloscope to DC input mode and connect it to TP9. 3. Adjust VR305 to obtain maximum DC level on the oscilloscope. 4. Set the RF level to 30 dBf and connect the oscilloscope to TP8. 5. Turn VR306 and check that the level on the oscilloscope changes from 0 V to approx. 5.5 V. Next, slowly turn VR306 to obtain 3.9 V at TP8. 6. Set the RF level to 45 dBf and cut the 1 kHz audio signals. 7. With switching ON and OFF the Schotz NR switch, check that the noise to signal ratio is improved more than 6 dB in Schotz NR ON mode. If not, repeat steps 1 through 6.

3.2. AM Adjustment

STEP	ITEM	OUTPUT CONNECTION	MODE	ADJUST-MENT	REMARKS
1	Level Adjustment	VTVM to Output Jack	AM Generator 1000 kHz 75 dBμ ST-7/ST-7E AM Mode	Main P.C.B. VR307	Adjust VR307 to obtain 900 mV on the VTVM.
2	AM Signal Meter Sensitivity Adjustment	None	AM Generator 1000 kHz 75 dBμ ST-7/ST-7E Meter - Signal	Main P.C.B. VR308	Adjust VR308 so that all figures (1 - 5) on the Signal Meter light up.

4. MECHANISM ASS'Y AND PARTS LIST

4.1. Synthesis

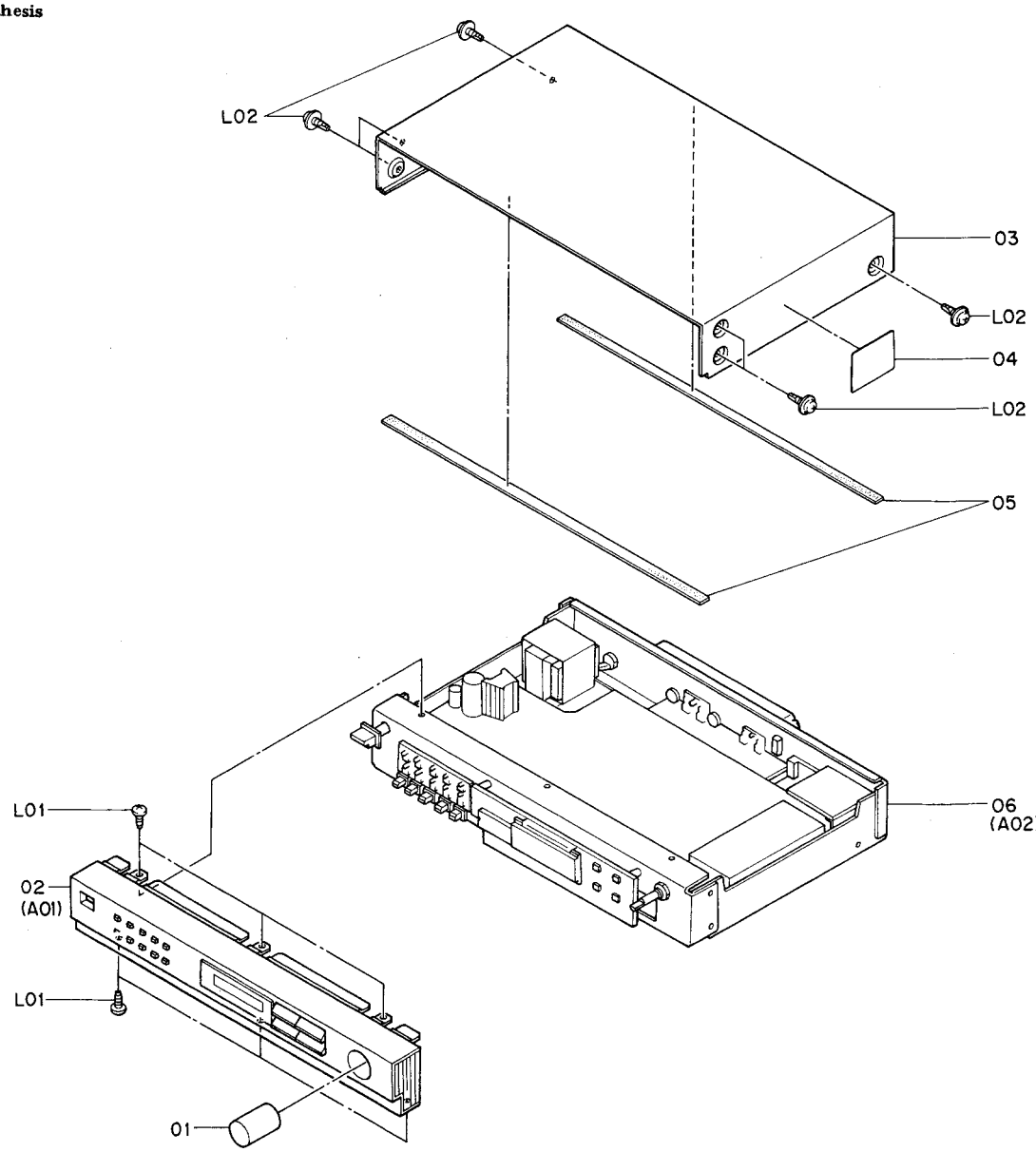


Fig. 4.1

Schematic Ref. No.	Part No.	Description	Q'ty
		Synthesis Serial No.: C10401001 -	
01	HA04818A	Tuning Knob Ass'y	1
02	HA04816A	Front Panel Ass'y ST-7	1
	HA04817A	Front Panel Ass'y ST-7E	1
03	0H04668A	Top Cover	1
04	0M04377B	Caution Label	1
05	0J05002C	Top Cover Himelon	2
06	—	Chassis Ass'y	1
L01	0E03283A	ST3x6 ⊕ Binding (Black Chromate)	6
L02	0E03278A	BT3x8 ⊕ Pan (Black Chromate)	6

4.2. Front Panel Ass'y (A01)

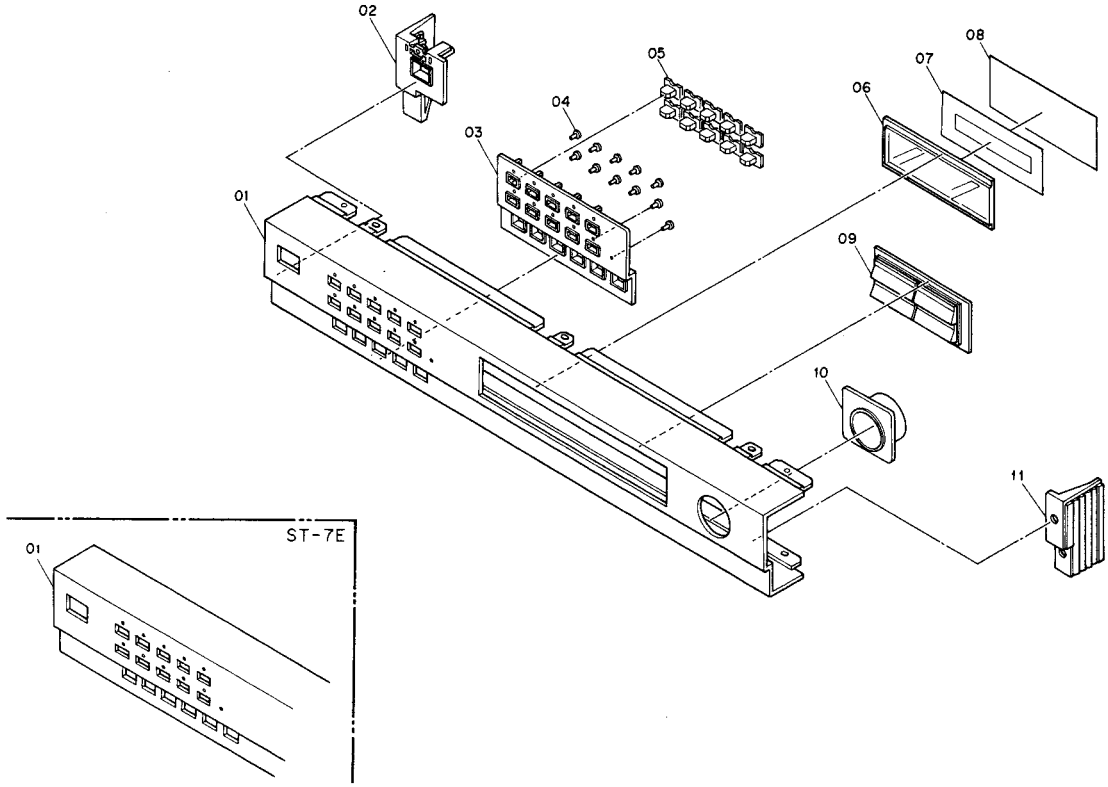


Fig. 4.2

Schematic Ref. No.	Part No.	Description	Q'ty
A01	HA04816A	Front Panel Ass'y ST-7	1
	HA04817A	Front Panel Ass'y ST-7E	1
		Serial No.: C10401001 -	
01	0H04620B	Front Panel ST-7	1
	0H04621B	Front Panel ST-7E	1
02	0H04640B	Side Panel L	1
03	0J04997A	Station Button Base	1
04	0H04639B	Lens	11
05	0H04644A	Station Button	10
06	0H04647A	FL Indicator Lens	1
07	0J04996A	FL Indicator Filter A	1
08	0J04995A	FL Indicator Filter B	1
09	HA04800A	Up Button Ass'y	1
10	0H04648B	Volume Knob Holder	1
11	0H04641A	Side Panel R	1
A02	—	Chassis Ass'y	1
		Serial No.: C10401001 -	
01	BA05708A	Display P.C.B. Ass'y ST-7 (U.S.A. & Canada)	1
	BA05709A	Display P.C.B. Ass'y ST-7 (Australia) & ST-7E	1
02	0J04988A	Front Chassis	1
03	BA05711A	Incremental Rotary Encoder Ass'y	1
04	BA05697A	Memory Switch P.C.B. Ass'y	1
05	HA04799B	Power Button Ass'y	1
06	BA05701A	Power Switch P.C.B. Ass'y ST-7 (U.S.A. & Canada)	1
	BA05702A	Power Switch P.C.B. Ass'y ST-7 (Australia) & ST-7E	1
07	0H04643A	Push Button ST-7	5
	0H04643A	Push Button ST-7E	6
08	BA05698A	Function Switch P.C.B. Ass'y ST-7	1
	BA05699A	Function Switch P.C.B. Ass'y ST-7E	1
09	0B50042A	Power Transformer ST-7 (U.S.A. & Canada)	1
	0B50043A	Power Transfromer ST-7 (Australia) & ST-7E	1
10	HA04810A	Rear Panel Ass'y ST-7 (U.S.A.)	1
	HA04814A	Rear Panel Ass'y ST-7 (Canada)	1
	HA04812A	Rear Panel Ass'y ST-7 (Australia)	1
	HA04811A	Rear Panel Ass'y ST-7E (220V Class 2)	1
	HA04813A	Rear Panel Ass'y ST-7E (UK)	1
11	0J05019A	Collar Bushing NB-300	4
12	BA05691A	Main P.C.B. Ass'y ST-7 (U.S.A. & Canada)	1
	BA05693A	Main P.C.B. Ass'y ST-7 (Australia) & ST-7E	1
13	0J05020A	Collar Bushing NA-310	4
14	0J05027A	Earth Spacer	1
15	0J05005A	P.C.B. Cushion	1
16	BA05735A	AM P.C.B. Ass'y	1
17	0J05018A	AM P.C.B. Holder	1
18	0H04626B	Main Chassis	1
19	0B91009A	Front-end FD812	1
20	0J03564A	Leg T-S	
21	0B90019A	SK Binder	11
22	0J05054A	P.C.B. Himelon	1
23	0B70059A	Wire ST-7E	1
L01	0E03279A	ST3x18 ⊕Binding (Black Chromate)	12
L02	—	Nut	1
L03	—	Washer	1
L04	0E03317A	ST3x6 ⊕Binding	10
L05	0E00612A	M3x6 ⊕Pan (2A)	4
L06	0E00896A	M3x6 ⊕Binding	1
L07	0J05057A	Fiber Washer 3.4x7x0.5	1
L08	0E00172A	Washer 3mm Toothed Lock	2
L09	0E00037A	Earth Lug B-5	2
L10	0E03283A	ST3x6 ⊕Binding (Black Chromate)	10
L11	0E00865A	BT3x10 ⊕Binding	4
L12	0E00907A	ST4x8 ⊕Binding (Black Chromate)	2

4.3. Chassis Ass'y (A02)

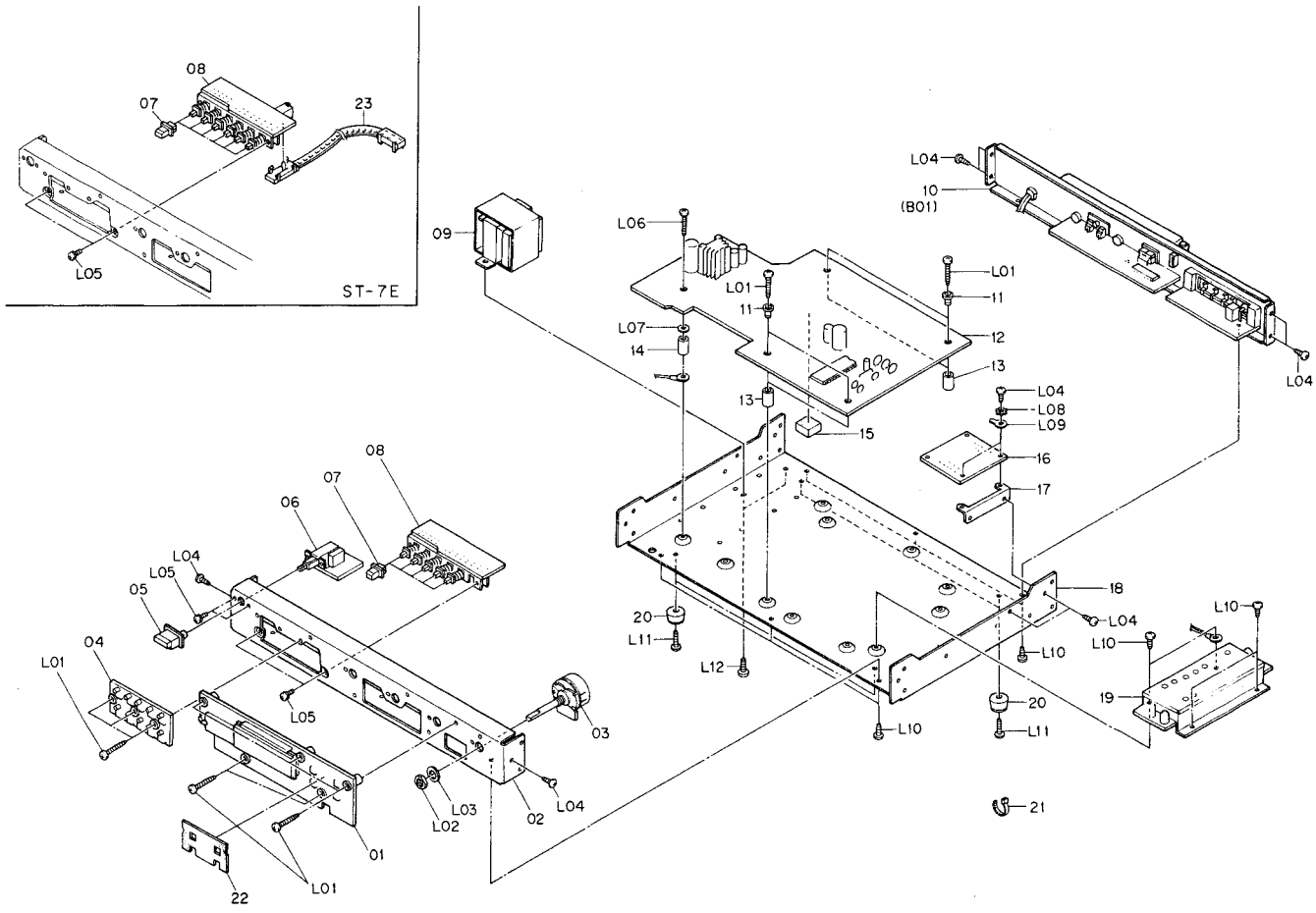


Fig. 4.3

4.4. Rear Panel Ass'y (B01)

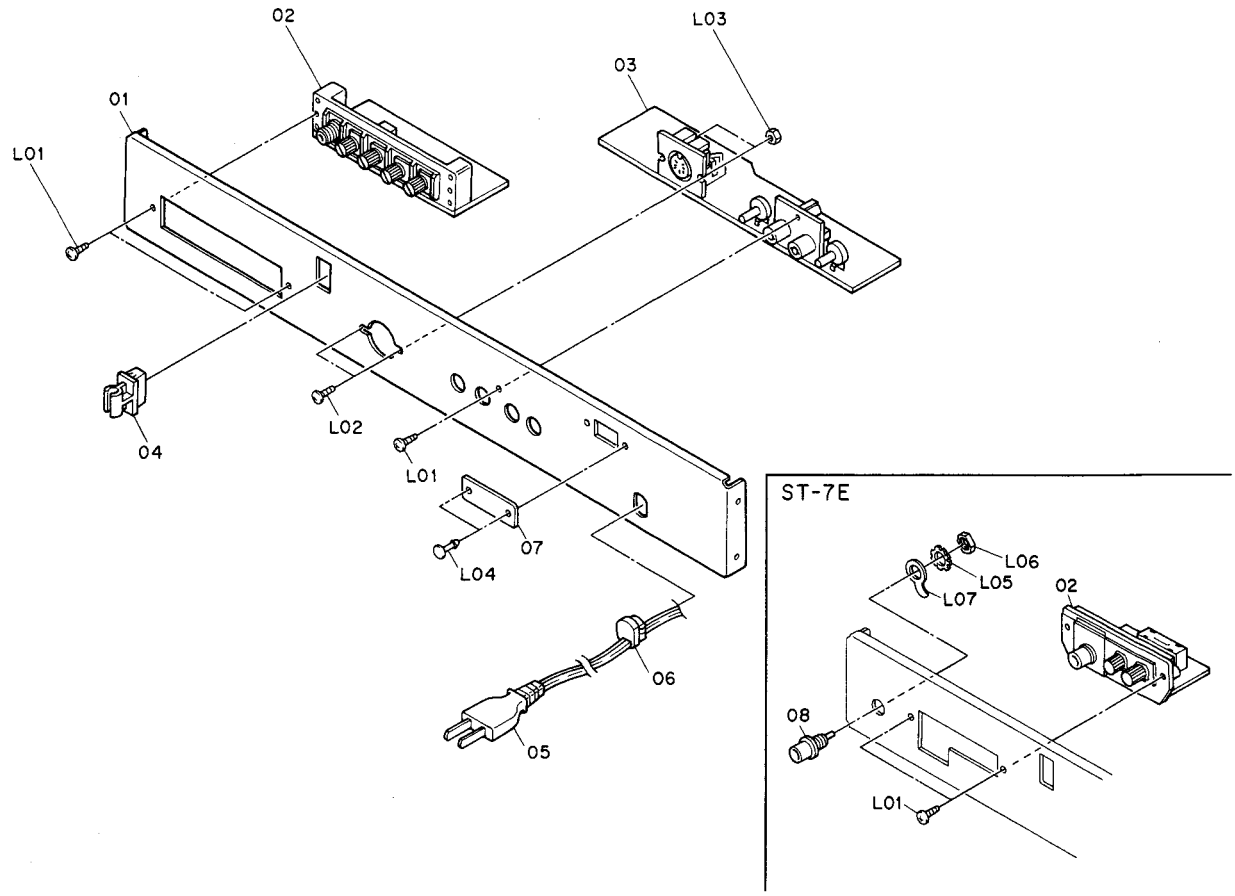


Fig. 4.4

Schematic Ref. No.	Part No.	Description	Q'ty
B01	**HA04810A**	**Rear Panel Ass'y ST-7 (U.S.A.)**	**1**
	HA04814A	**Rear Panel Ass'y ST-7 (Canada)**	**1**
	HA04812A	**Rear Panel Ass'y ST-7 (Australia)**	**1**
	HA04811A	**Rear Panel Ass'y ST-7E (220V Class 2)**	**1**
	HA04813A	**Rear Panel Ass'y ST-7E (UK)** Serial No.: C10401001 -	**1**
01	0H04656A	Rear Panel Ass'y ST-7	1
	0H04657B	Rear Panel Ass'y ST-7E	1
02	BA05696A	Antenna P.C.B. Ass'y ST-7	1
	BA05695A	Antenna P.C.B. Ass'y ST-7E	1
03	BA05694A	Pin Jack P.C.B. Ass'y	1
04	0B90071A	AM Loop Antenna Holder	1
05	0B08533A	Power Cord ST-7 (U.S.A.)	1
	0B08504A	Power Cord ST-7 (Canada)	1
	0B05241A	Power Cord ST-7 (Australia)	1
	0B08093U	Power Cord ST-7E (220V Class 2)	1
	0B08348A	Power Cord ST-7E (UK)	1
06	0B08037U	Cord Bushing C ST-7 (U.S.A. & Australia) & ST-7E (220V Class 2)	1
	0B08351A	Cord Bushing 4K-4 ST-7 (Canada) & ST-7E (UK)	1
07	0J04601B	Switch Cover	1
08	0B90079A	Antenna Plug ST-7E	1
L01	0E00921A	BT3x8 ⊕ Binding (Black Chromate)	3
L02	0E00818A	M3x8 ⊕ Binding (Black Chromate)	2
L03	0E00507A	Nut Hex. M3	2
L04	0B08583A	Plastic Rivet	2
L05	0E03284A	Washer 10mm Toothed Lock ST-7E	1
L06	—	Nut for Antenna Plug ST-7E	(1)
L07	—	Earth Lug for Antenna Plug ST-7E	(1)

5. MOUNTING DIAGRAMS AND PARTS LIST

Notes: 1. Mounting diagram shows a dip side view of the printed circuit board.
2. Diode is 1SS53, 1S1555, or 1SS176 unless otherwise specified.
3. Following transistors are interchangeable with each other.
   a. 2SA733, 2SA608SP, 2SA1048, 2SA1175
   b. 2SC945, 2SC536SP, 2SC2458, 2SC2785
4. Abbreviation for part name:
   TR — Transistor, SiD — Silicon Diode, GD — Germanium Diode, ZD — Zener Diode
   RK — Carbon Resistor, RM — Metal Film Resistor, RF — Fail Safe Type Resistor
   CE — Electrolytic Capacitor, CM — Mylar Capacitor, CC — Ceramic Capacitor, CP — PP Capacitor,
   CT — Tantalum Capacitor, CF — Film Capacitor, C — Mica Capacitor

5.1. Power Switch P.C.B. Ass'y

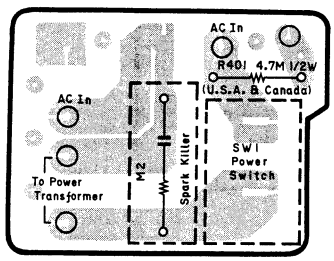


Fig. 5.1

5.2. Antenna P.C.B. Ass'y

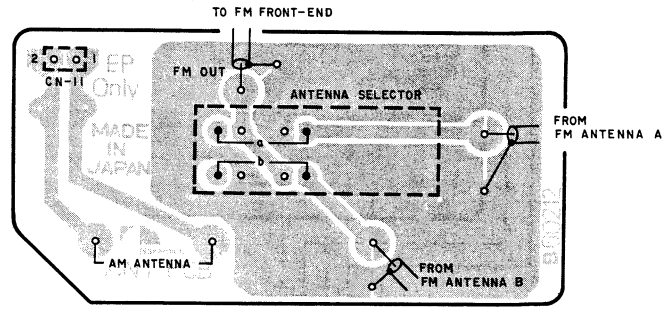


Fig. 5.2.1 For ST-7E

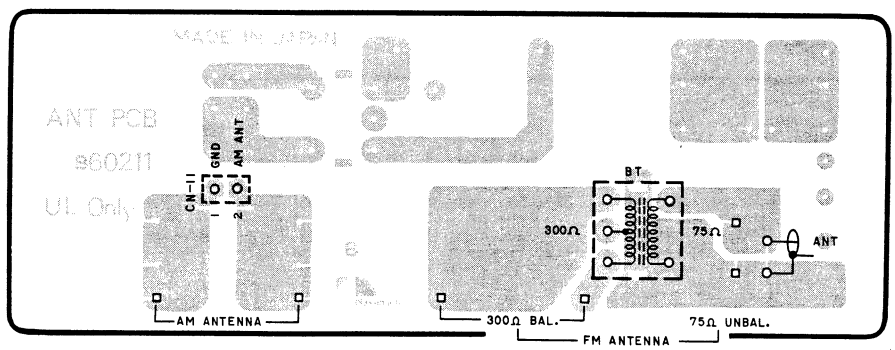


Fig. 5.2.2 For ST-7

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
	BA05701A	Power Switch P.C.B. Ass'y ST-7 (U.S.A. & Canada)		BA05695A	Antenna P.C.B. Ass'y ST-7E
	BA05702A	Power Switch P.C.B. Ass'y ST-7 (Australia) & ST-7E	CN11	0B60212A 0B81223A 0B90078A	Antenna P.C.B. 2P-T Post Antenna Terminal (1)
	0B60203B	Power Switch P.C.B.		0B80081A	Antenna Cable (1)
R401	0B20057A	RK 4.7M 1/2W J ST-7 (U.S.A. & Canada)		0B90019A 0B70058A	SK Binder (1) Antenna Selector (1)
SW1	0B70002A	Power Switch			
M2	0B08342A	Spark Killer ST-7 (U.S.A. & Canada)		BA05696A	Antenna P.C.B. Ass'y ST-7
M2	0B08445A	Spark Killer ST-7 (Australia) & ST-7E		0B60211B	Antenna P.C.B.
	0B90059A	Spark Killer Cover ST-7 (Australia) & ST-7E (1)	BT CN11	0B50045A 0B81223A 0B90072A	Balun Transformer 2P-T Post Antenna Terminal (1)
	0B90019A	SK Binder (3)		0B90019A	SK Binder (1)
	0E00752A	Eyelet 2x3 (2)			
	0B81409A	Switch GND ST-7 (U.S.A. & Canada) (1)			

5.3. Memory Switch P.C.B. Ass'y

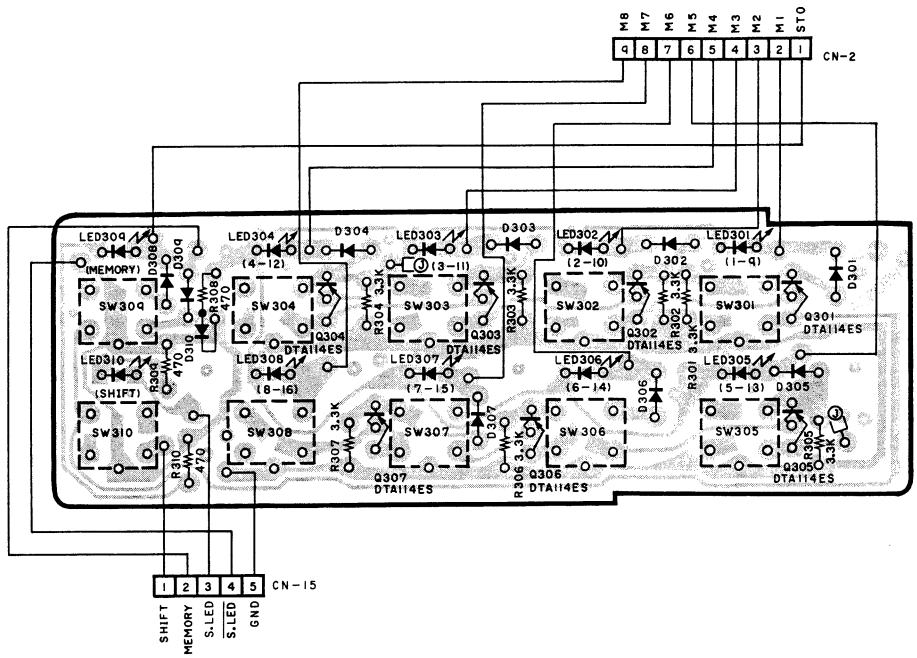


Fig. 5.3

5.4. Function Switch P.C.B. Ass'y

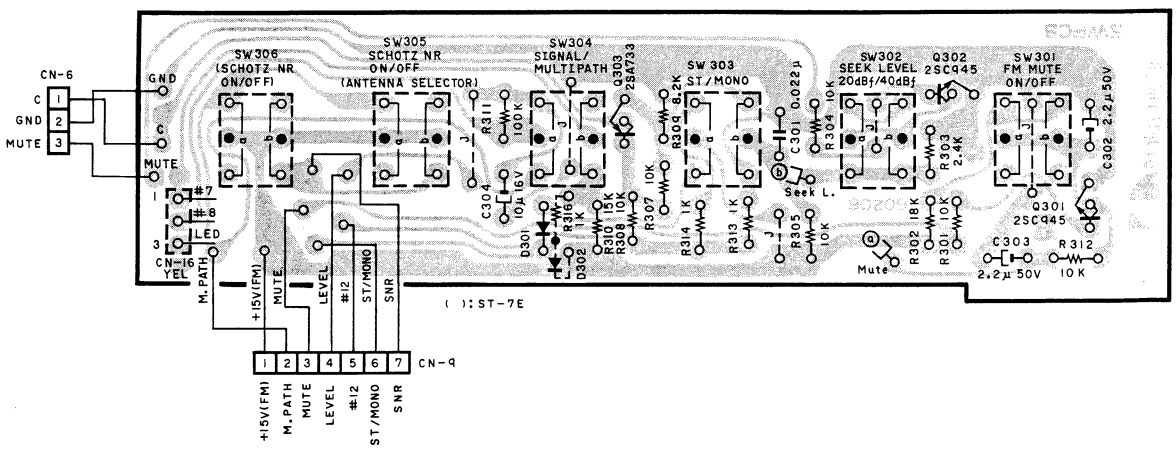


Fig. 5.4

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
	BA05697A	Memory Switch P.C.B. Ass'y		BA05698A	Function Switch P.C.B. Ass'y ST-7	R313,314 316	0B09677A	RK 1K 1/6W J
				BA05699A	Function Switch P.C.B. Ass'y ST-7E	C301	0B09860A	CM 0.022μ 50V J
	0B60207A	Memory Switch P.C.B.				C302,303	0B09372A	CE 2.2μ 50V
						C304	0B40009A	CE 10μ 16V
Q301-307	0B10058A	TR DTA114ES		0B60206B	Function Switch P.C.B.	CN6	0B81354B	3P Connector
LED301-310	0B12215A	LED SLP202C Green				CN9	0B81367A	7P Connector
			Q301,302	0B10025A	TR 2SC945L (P,K)	CN16	0B81186A	3P-S Post
D301-310	0B06398A	SiD 1SS176	Q303	0B06155A	TR 2SA733 (P)	SW301-305	0B70040A	Push Switch 5-Key ST-7
R301-307	0B09689A	RK 3.3K 1/6W J	D301,302	0B06398A	SiD 1SS176			
R308,309 310	0B09669A	RK 470 1/6W J	R301,304 305,307 308,312	0B09701A	RK 10K 1/6W J	SW301-306	0B70041A	Push Switch 6-Key ST-7E
SW301-310	0B70043A	Tact Switch						
CN2	0B81362A	9P Connector	R302	0B09707A	RK 18K 1/6W J			
CN15	0B81356B	5P Connector	R303	0B09686A	RK 2.4K 1/6W J			
	0J04703A	Bushing TB-300 (3)	R309	0B09699A	RK 8.2K 1/6W J			
	0J05008A	Bushing TA-310 (3)	R310	0B09705A	RK 15K 1/6W J			
	0J05001A	Reflector (10)	R311	0B09725A	RK 100K 1/6W J			

5.5. Pin Jack P.C.B. Ass'y

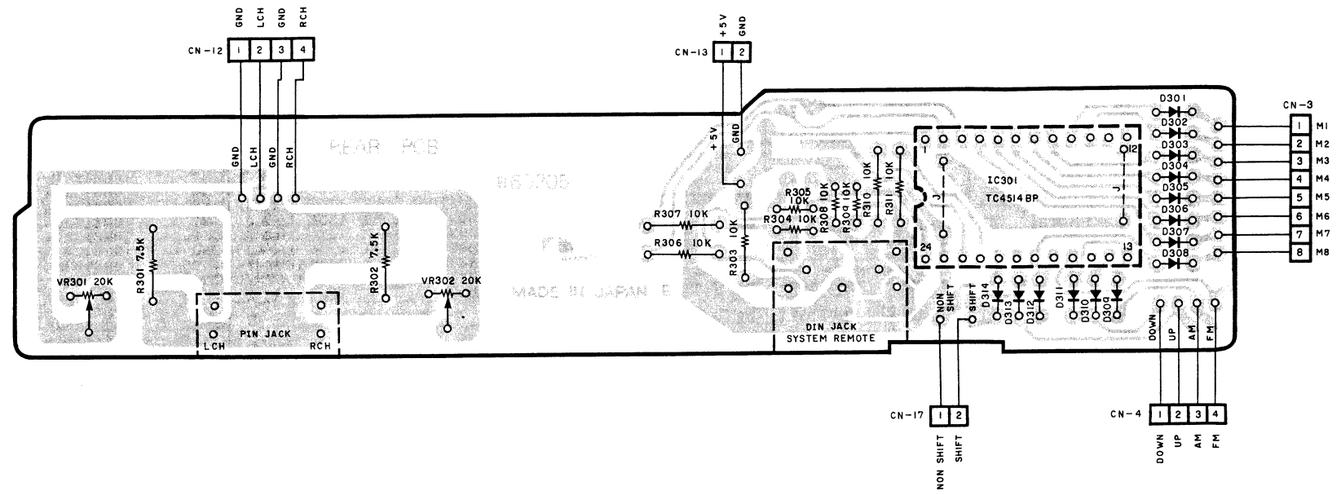


Fig. 5.5

5.6. Display P.C.B. Ass'y

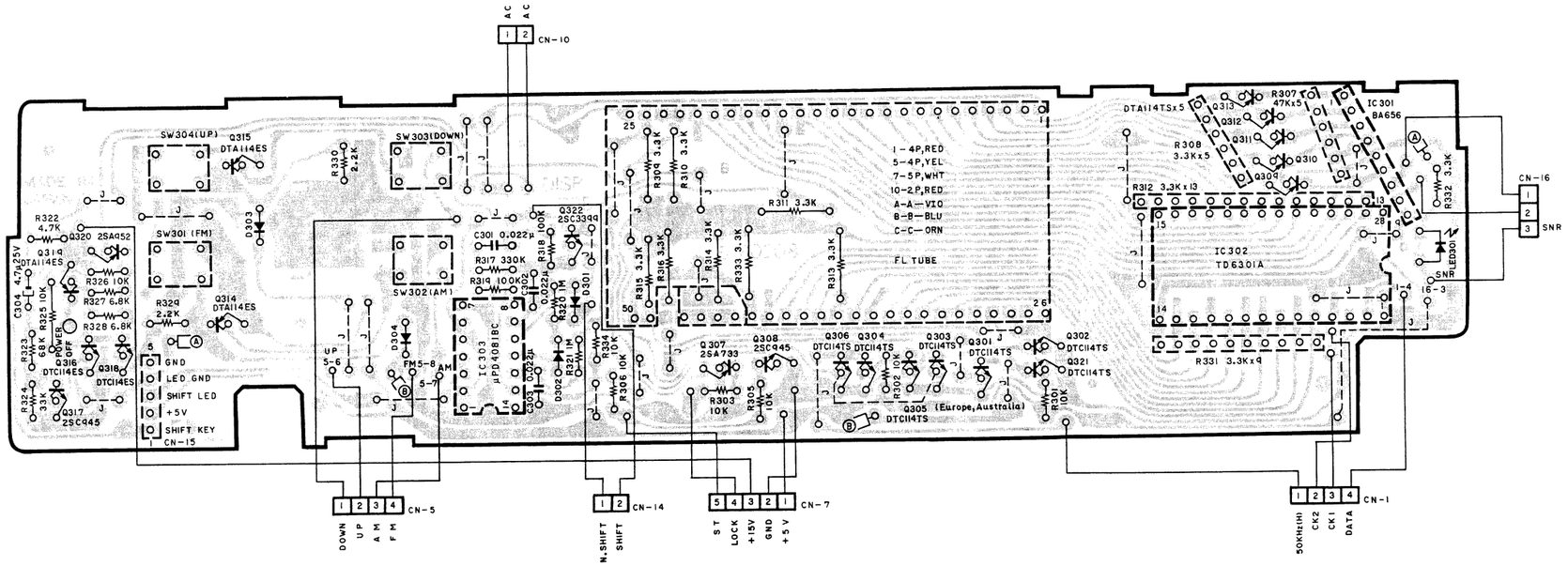


Fig. 5.6

Schematic Ref. No.	Part No.	Description
	BA05694A	**Pin Jack P.C.B. Ass'y**
	0B60205B	Pin Jack P.C.B.
IC301	0B11179A	IC M4514BP
D301-314	0B06398A	SiD 1SS176
VR301,302	0B32042A	Potentiometer 20K
R301,302	0B09183A	RK 7.5K 1/4W J
R303,306 307,310 311	0B01888A	RK 10K 1/4W J
R304,305 308,309	0B09701A	RK 10K 1/6W J
CN3	0B81363B	8P Connector
	0B81358B	4P Connector (1)
	0B81360A	4P Connector (1)
	0B82410B	2P Connector (1)
	0B81408B	2P Connector (1)
	0B81350A	7P DIN Socket (1)
	0B81351A	2P Pin Jack (1)
	BA05708A	**Display P.C.B. Ass'y ST-7 (U.S.A. & Canada)**
	BA05709A	**Display P.C.B. Ass'y ST-7 (Australia) & ST-7E**
	0B60208B	Display P.C.B.
IC301	0B11162A	IC BA656
IC302	0B11160A	IC TD6301A
IC303	0B06219A	IC μPD4081BC
Q301-306 321	0B10104A	TR DTC114TS
Q307	0B06013A	TR 2SA733 (P,Q)
Q308,317	0B01872A	TR 2SC945L (P,Q)
Q309-313	0B10057A	TR DTA114TS
Q314,315 319	0B10058A	TR DTA114ES
Q316,318	0B10068A	TR DTC114ES
Q320	0B10097A	TR 2SA952 (K,L)
Q322	0B10007A	TR 2SC3399
LED301	0B12215A	LED SLP202C Green
D301,302 303,304	0B06398A	SiD 1SS176
R301-303 305,306 326,334	0B09701A	RK 10K 1/6W J
R307	0B21006A	R Network 47Kx5
R308	0B21007A	R Network 3.3Kx5
R309,310 311,313 314,315 316,333	0B09533A	RK 3.3K 1/4W J
R312	0B21005A	R Network 3.3Kx13
R317	0B09737A	RK 330K 1/6W J
R318,319	0B09725A	RK 100K 1/6W J
R320,321	0B09749A	RK 1M 1/6W J
R322	0B09693A	RK 4.7K 1/6W J
R323	0B09721A	RK 68K 1/6W J
R324	0B09713A	RK 33K 1/6W J
R325	0B01888A	RK 10K 1/4W J
R327,328	0B09697A	RK 6.8K 1/6W J
R329,330	0B09685A	RK 2.2K 1/6W J
R331	0B21004A	R Network 3.3Kx9
R332	0B09689A	RK 3.3K 1/6W J
C301,302 303	0B09860A	CM 0.022μ 50V J
C304	0B40272A	CE 4.7μ 25V
SW301,302 303,304	0B70043A	Tact SW
CN1	0B81357B	4P Connector
CN5	0B81359A	4P Connector
CN7	0B81361A	5P Connector
CN10	0B81352A	2P Connector
CN14	0B81368A	2P Connector
CN15	0B81193A	5P-S Post
CN16	0B81369B	3P Connector
	0B90074A	FL Tube (1)
	0J05004B	FL Cushion (3)
	0J05001A	Reflector (1)
	0J04703A	Bushing TB-300 (5)
	0J05008A	Bushing TA-310 (5)

5.7. AM P.C.B. Ass'y

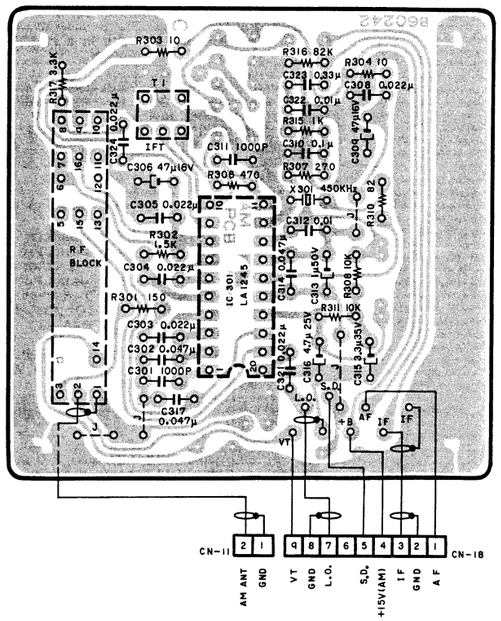


Fig. 5.7

Schematic Ref. No.	Part No.	Description
	BA05735A	AM P.C.B. Ass'y
	0B60242C	AM P.C.B.
IC301	0B11178A	IC LA1245
T1	0B51213A	IFT 450kHz
X301	0B92003A	Crystal 450kHz
R301	0B09657A	RK 150 1/6W J
R302	0B09681A	RK 1.5K 1/6W J
R303,304	0B09216A	RF 10 1/6W J
R306	0B09669A	RK 470 1/6W J
R307	0B09663A	RK 270 1/6W J
R308,311	0B09701A	RK 10K 1/6W J
R310	0B09651A	RK 82 1/6W J
R315	0B09677A	RK 1K 1/6W J
R316	0B09723A	RK 82K 1/6W J
R317	0B09689A	RK 3.3K 1/6W J
C301,311	0B09288A	CC 1000P 50V K
C302,314 317	0B41027A	CC 0.047μ 25V M
C303,304 305,308 321,324	0B41023A	CC 0.022μ 25V M
C306,309	0B40012A	CE 47μ 16V
C310	0B09292A	CC 0.1μ 50V Z
C312,322	0B41019A	CC 0.01μ 25V M
C313	0B40189A	CE 1μ 50V
C315	0B40169A	CE 3.3μ 35V
C316	0B40014A	CE 4.7μ 25V
C323	0B09778A	CM 0.33μ 50V M
CN11	0B82481B	2P Connector
CN18	0B82444B	9P Connector
	0B51214A	AM RF Block

Schematic Ref. No.	Part No.	Description
	BA05691A	Main P.C.B. Ass'y ST-7 (U.S.A. & Canada)
	0B60204C	Main P.C.B.
IC301,302	0B11156A	IC TA7060AP
IC303	0B11157A	IC LA1235
IC304	0B11158A	IC LA3380
IC305,306	0B11163A	IC TL074
IC307	0B06144A	IC μPD4066BC
IC308	0B11164A	IC LM13600
IC309	0B06146A	IC NJM4558DD
IC310	0B11161A	IC TC9147BP
IC311	0B11159A	IC TD6104
IC312	0B06178A	IC μPD4011BC
IC401	0B11012A	IC μPC7815H
Q101,201	0B06299A	TR 2SC2878
Q103,203 406	0B10058A	TR DTA114ES
Q301	0B06461A	FET 2SK161
Q302,303 304,305 307,308 309,310 311,313 314,315 316,319 320,322 326,327 401,402 403,405	0B10025A	TR 2SC945L (P,K)
Q306,312 321,404	0B06155A	TR 2SA733 (P)
Q317	0B06129A	FET 2SK117
Q322	0B06252A	TR 2SB564 (K)
Q323,325 328	0B06372A	TR 2SA953 (K,L)
Q329,330 331	0B10068A	TR DTC114ES
ZD301	0B12110A	ZD 6.2V RD6.2EB2
ZD302	0B06191A	ZD 2.7V RD2.7E
ZD401	0B12255A	ZD 31V RD33EB2
ZD402	0B06290A	ZD 5.6V RD5.6EB2
D301,302 303,304	0B06373A	GD 1M60TP-B
D305 307-315 320,321 326-329 338,340 342,344 345,346 403-406	0B06398A	SiD 1SS176 (25)
D316,317 318,319 330-337 343	0B06181A	SiD 1SS53 (13)
D401,402	0B12264A	SiD 1SS132
DB401,402	0B06282A	Diode Bridge DBA10
L301,302 303,307 308	0B51175A	Micro Coil 22μH
L304	0B51207B	FM Det. Coil A
L305	0B51208B	FM Det. Coil B
L306	0B51210C	19K Adj. Coil
BL101,201	0B51209A	MPX Filter
XL301	0B92002A	Crystal 7.2 MHz
VR101,201	0B07270A	Potentiometer 20K
VR102,202 303,308	0B07257A	Potentiometer 100K
VR301	0B07258A	Potentiometer 220K
VR302,304 307	0B07256A	Potentiometer 10K
VR305,306	0B07269A	Potentiometer 50K
R101,201 356,391 718,719 763	0B09721A	RK 68K 1/6W J
R102,202	0B09314A	RK 5.1K 1/4W J
R103,203 325,369 376,729 752	0B09693A	RK 4.7K 1/6W J
R104,204	0B05615A	RK 22K 1/4W J
R105,110 205,210 352,387 411,753	0B09705A	RK 15K 1/6W J
R106,206	0B09629A	RK 10 1/6W J
R107,207 351	0B01681A	RK 3.3K 1/4W J
R108,208 372,382	0B09689A	RK 3.3K 1/6W J
R109,209 758	0B09717A	RK 47K 1/6W J
R111,211 320,334 335,406 743	0B09709A	RK 22K 1/6W J
R112,212 755	0B05509A	RK 33K 1/4W J
R113,213	0B22444A	RM 76.8K 1/6W F
R114,214 329,394 730,748	0B09685A	RK 2.2K 1/6W J
R115,215 379	0B09695A	RK 5.6K 1/6W J
R116,216 316,319 338,342 346,347 353,360 361,385 389,393 398,415 701,703 713,721 722,726 727,731 732,759	0B09701A	RK 10K 1/6W J
R301	0B05577A	RK 330 1/4W J
R302,303 304,308 326	0B05691A	RK 390 1/4W J
R305,306 307,310 333,403	0B05936A	RK 10 1/4W J
R309,373	0B05794A	RK 680 1/4W J
R311,313 370,711	0B05576A	RK 470 1/4W J
R312	0B05668A	RK 82K 1/4W J
R314,322 323,324 357,371 374,392 707,725 733,734 761	0B01888A	RK 10K 1/4W J
R315,350 401	0B01679A	RK 100 1/4W J
R317	0B09745A	RK 680K 1/6W J
R318,383	0B09653A	RK 100 1/6W J
R321,344 345,354 358,359 362,363 364,365 368,375 377,386 395,396 404,702 762	0B09677A	RK 1K 1/6W J
R327	0B01856A	RK 8.2K 1/4W J
R328	0B09698A	RK 7.5K 1/6W J
R330	0B05508A	RK 56K 1/4W J
R336,704	0B09699A	RK 8.2K 1/6W J
R337	0B01854A	RK 39K 1/4W J
R339	0B05560A	RK 18K 1/4W J
R340	0B09645A	RK 47 1/6W J
R341,380 706,728	0B01846A	RK 4.7K 1/4W J
R343	0B05743A	RK 27K 1/4W J
R348,388	0B09708A	RK 20K 1/6W J
R349,381	0B09729A	RK 150K 1/6W J
R355,390	0B09719A	RK 56K 1/6W J
R366,367	0B09183A	RK 7.5K 1/4W J
R378	0B09694A	RK 5.1K 1/6W J
R384,751	0B09711A	RK 27K 1/6W J
R397,399	0B09713A	RK 33K 1/6W J
R402,413 716	0B01857A	RK 1K 1/4W J
R405,414 714,717 720,724 735,746 747	0B09725A	RK 100K 1/6W J
R407,409 416,757	0B09727A	RK 120K 1/6W J
R408	0B09715A	RK 39K 1/6W J
R410,749 750	0B09737A	RK 330K 1/6W J
R412	0B24083A	RF 180 1W J
R705	0B09663A	RK 270 1/6W J
R712	0B05626A	RK 150K 1/4W J
R715	0B09733A	RK 220K 1/6W J
R723,744 745	0B01889A	RK 100K 1/4W J
R737	0B01706A	RK 47 1/4W J
R754	0B09731A	RK 180K 1/6W J
R756	0B09704A	RK 13K 1/6W J
R760	0B05698A	RK 1.5K 1/4W J
C101,201	0B41122A	CP 750P 100V G
C102,202	0B41115A	CP 390P 100V G
C103,105 106,203 205,206 340,342	0B09816A	CE 10μ 16V (KS)
C104,204	0B05681A	CM 0.01μ 50V J
C107,207 361	0B09833A	CE 4.7μ 25V (KS)
C301,365 385,393 411,412 413,414	0B09292A	CC 0.1μ 50V Z
C302-314 321,325 326,327 328,331 332,335 336,350	0B41554A	CC 0.022μ 50V Z
C315	0B41030A	CC 51P 50V J
C316,323 324,369 406	0B41555A	CC 0.047μ 50V Z
C317	0B05583A	CM 0.033μ 50V J
C318,366	0B40252A	CE 0.22μ 50V
C319,353 358,384	0B40009A	CE 10μ 16V
C320,334 337,387	0B40254A	CE 0.47μ 50V
C322,386	0B40255A	CE 1μ 50V
C329,397	0B40012A	CE 47μ 16V
C330	0B40230A	CE 220μ 16V
C333	0B01836A	CE 47μ 10V
C338	0B09393A	CC 68P 50V J
C339	0B09218A	CE 47μ 16V (LN)
C341,344	0B41369A	CM 0.033μ 50V J
C343,347 352,357	0B05557A	CM 0.015μ 50V J
C345,359 360	0B40099A	CE 4.7μ 35V
C346,407 408	0B40081A	CE 470μ 16V
C348	0B09235A	CP 680P 100V J
C349,395 402	0B40082A	CE 1000μ 16V
C351	0B09262A	CP 3000P 100V J
C354,392 394,416 700	0B40206A	CE 100μ 16V
C355,356 364,367 415	0B05582A	CM 0.022μ 50V J
C362	0B01862A	CE 22μ 16V
C363	0B40104A	CE 100μ 35V
C368	0B05796A	CM 0.047μ 50V J
C370,373 374	0B41553A	CC 0.01μ 50V Z
C371	0B41071A	CC 100P 50V J
C372	0B09370A	CC 33P 50V J
C377	0B41187A	CC 39P 50V J
C379,409	0B40112A	CE 1μ 50V
C380	0B41004A	CC 120P 50V J
C381	0B40358A	CE 47000μ 5.5V
C382	0B41614A	Trimmer Capacitor 30P
C383	0B09781A	CC 27P 50V J
C388	0B01802A	CM 2200P 50V J
C389,390	0B41177A	CM 0.33μ 50V J
C399	0B41608A	Polystyrene Capacitor 4700P 50V
C401	0B40109A	CE 2200μ 35V
C403	0B40123A	CE 470μ 50V
C404	0B40107A	CE 470μ 35V
C405	0B40100A	CE 10μ 35V
C410	0B40013A	CE 3.3μ 25V
CF301,302 303	0B41075A	Ceramic Filter SFE10.7MLK-A
TF1-3	0B08715A	Thermal Fuse 129
CN1	0B81233A	4P-T Post Red
CN2	0B81251A	9P-T Post White
CN3	0B81247A	8P-T Post White
CN4	0B81231A	4P-T Post White
CN5	0B81234A	4P-T Post Yellow
CN6	0B81229A	3P-T Post Red
CN7	0B81235A	5P-T Post White
CN8	0B81227A	3P-T Post White
CN9	0B81243A	7P-T Post White
CN10	0B81225A	2P-T Post Red
CN12	0B81232A	4P-T Post Black
CN13	0B81226A	2P-T Post Yellow
CN14	0B81224A	2P-T Post Black
CN17	0B08656A	2P-T Post
CN18	0B81254A	9P-T Post Yellow
F403,404	0B08374A	Fuse 1A
	0B81411A	F.E. Ground (1)
	0B81438A	Ground Cable (1)
	0B90091A	Heat Sink T-220H (1)
	0B82404A	Pin Plug A (ANT) (1)
	0B82405A	Pin Plug B (IF) (1)
	0B82406A	Pin Plug C (OSC) (1)
	0E00612A	M3x6 ⊕Pan (2A) (1)
	0E00868A	BT3x8 ⊕ Binding (1)
	BA05693A	Main P.C.B. Ass'y ST-7 (Australia) & ST-7E Contents is the same as BA05691A except for the following parts:
	0B41076A	Ceramic Filter SFE10.7MS3GKY-A
	0B08347U	Fuse T1A 250V
	0B08420A	Fuse T32mA
	0B08349B	Fuse Clip (4)

5.8. Main P.C.B. Ass'y

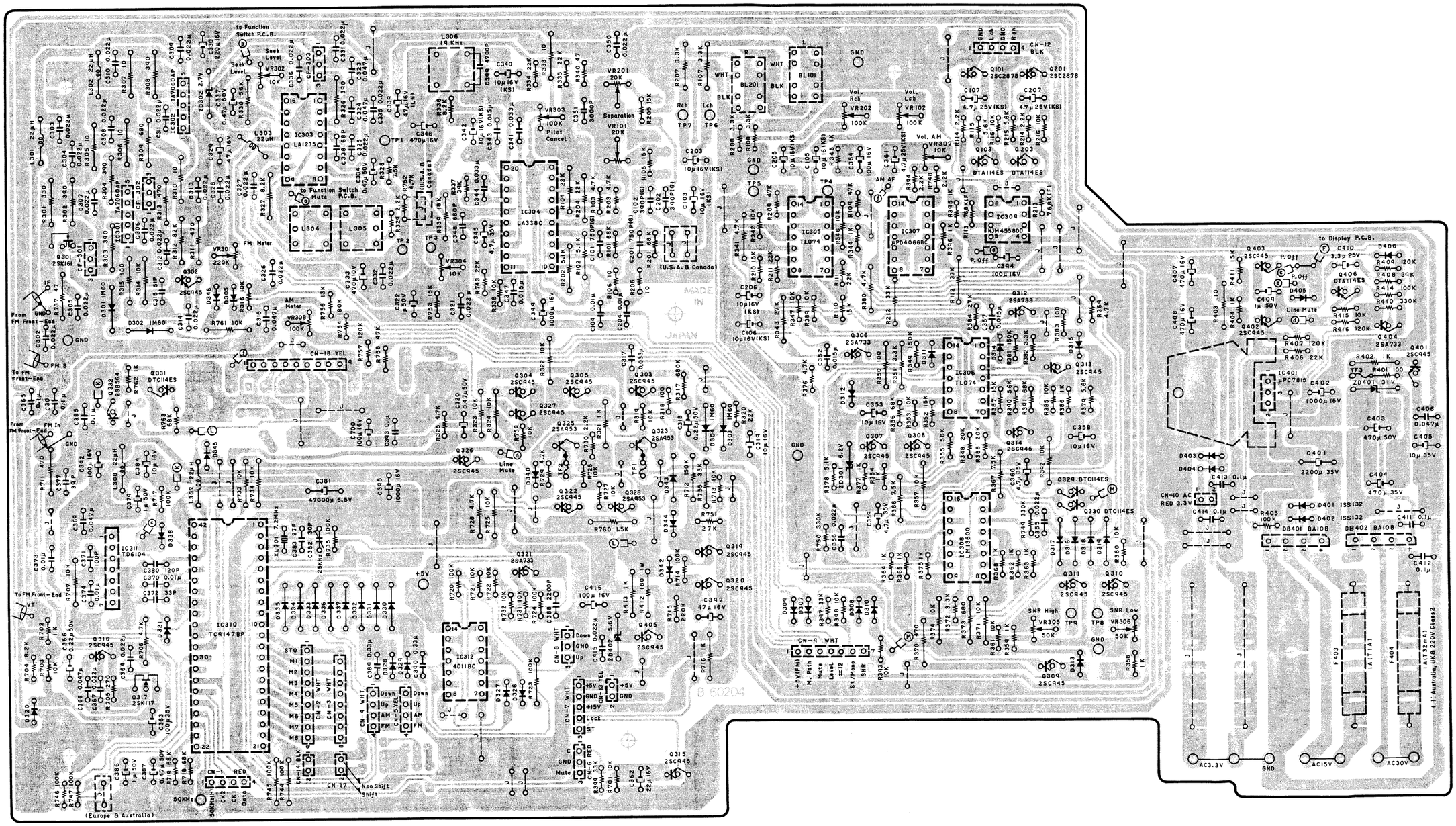


Fig. 5.8

6. SCHEMATIC DIAGRAM

6.1. IC Block Diagrams

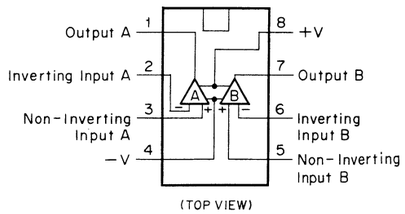


Fig. 6.1.1 Operational Amp. IC NJM4558DD

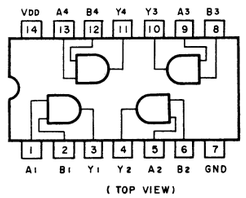


Fig. 6.1.2 AND Gate C-MOS IC μPD4081BC

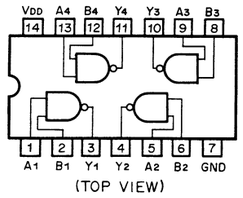


Fig. 6.1.3 NAND Gate C-MOS IC μPD4011BC

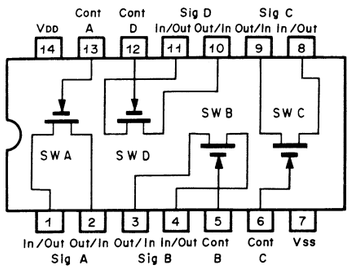


Fig. 6.1.4 Bilateral Switch C-MOS IC μPD4066BC

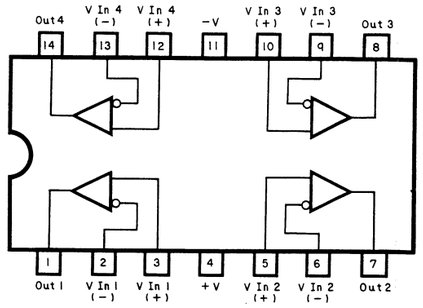


Fig. 6.1.5 Operational Amp. IC TL074

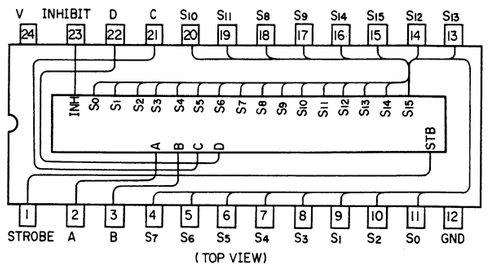


Fig. 6.1.6 4-to-16 Line Decoder IC M4514BP

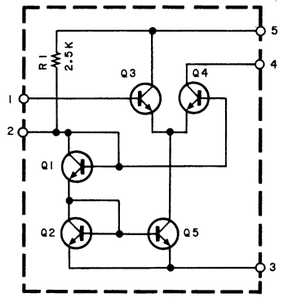


Fig. 6.1.7 FM IF Amp. IC TA7060AP

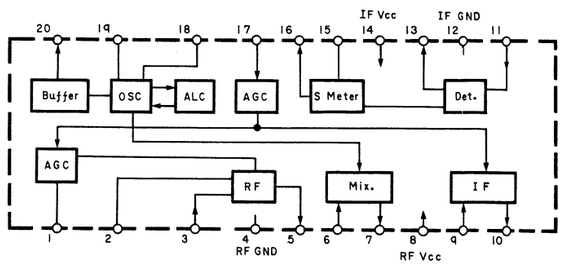


Fig. 6.1.11 AM Tuner IC (with Electronic Tuning of Table Top Stereo) LA1245

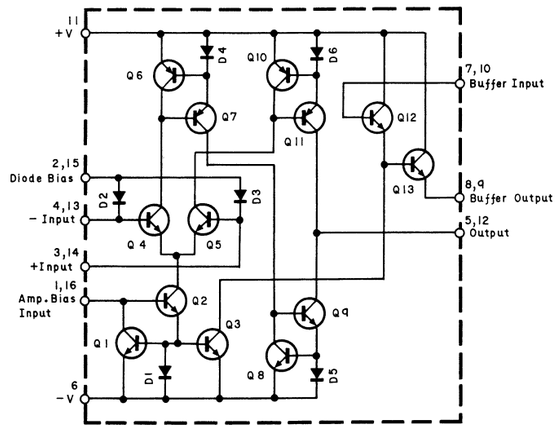


Fig. 6.1.9 Operational Transconductance Amp. (with Linearizing Diodes and Buffer) IC LM13600

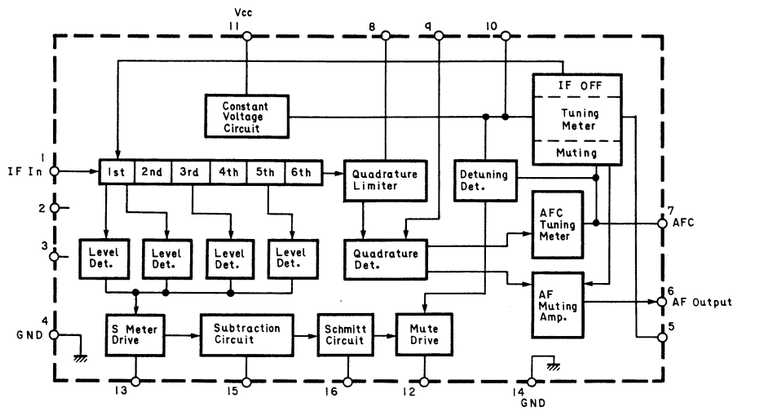


Fig. 6.1.10 FM IF System IC LA1235

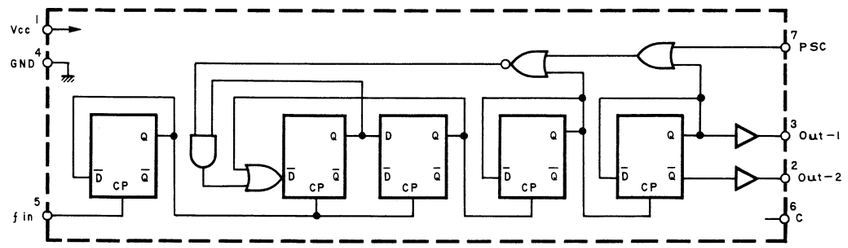


Fig. 6.1.11 ECL Prescaler (FM) IC TD6104

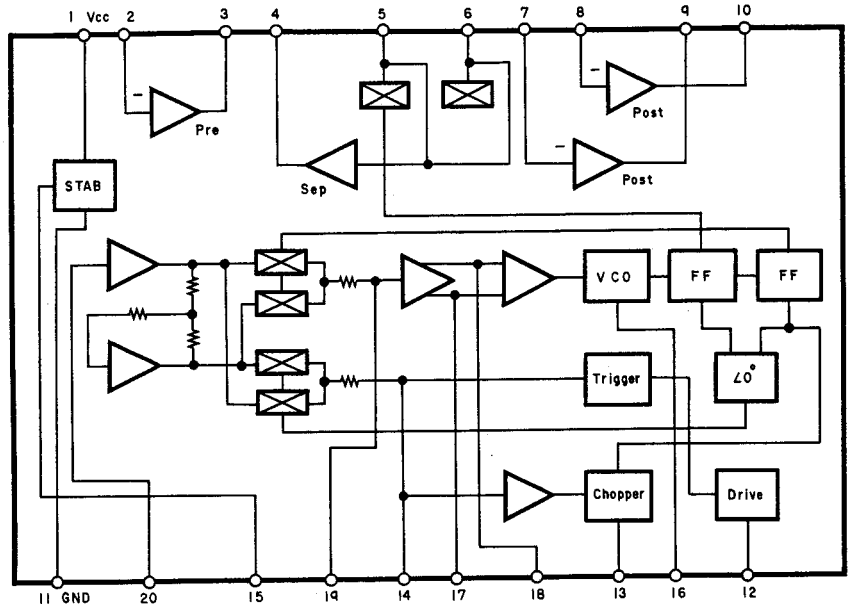


Fig. 6.1.12 PLL FM Stereo MPX Demodulator IC LA3380

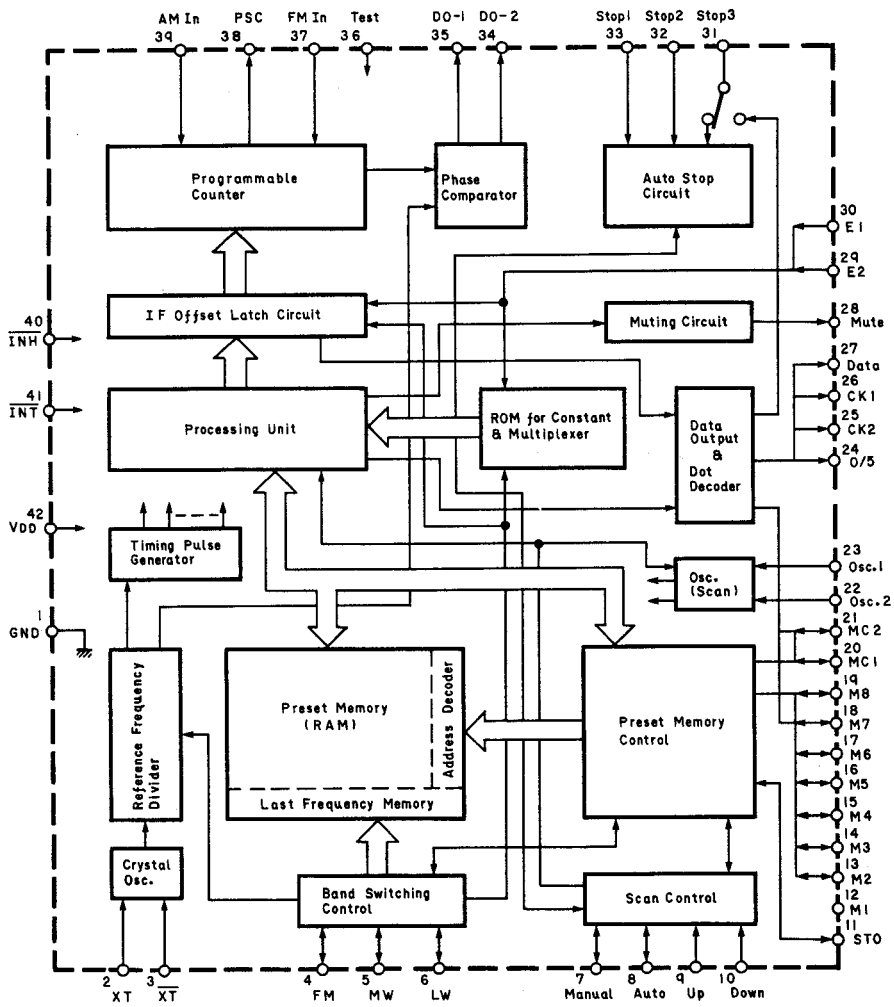


Fig. 6.1.13 FM/MW/LW 3-Band Digital Tuning (Static Method) IC TC9147BP

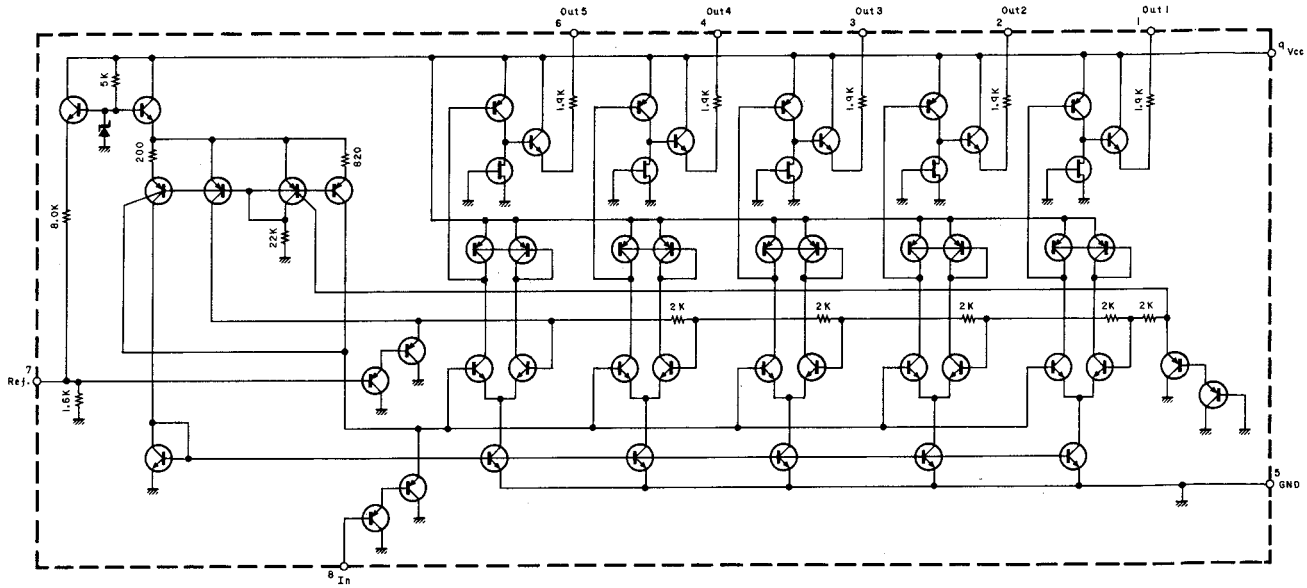


Fig. 6.1.14 Level Meter Driver IC BA656

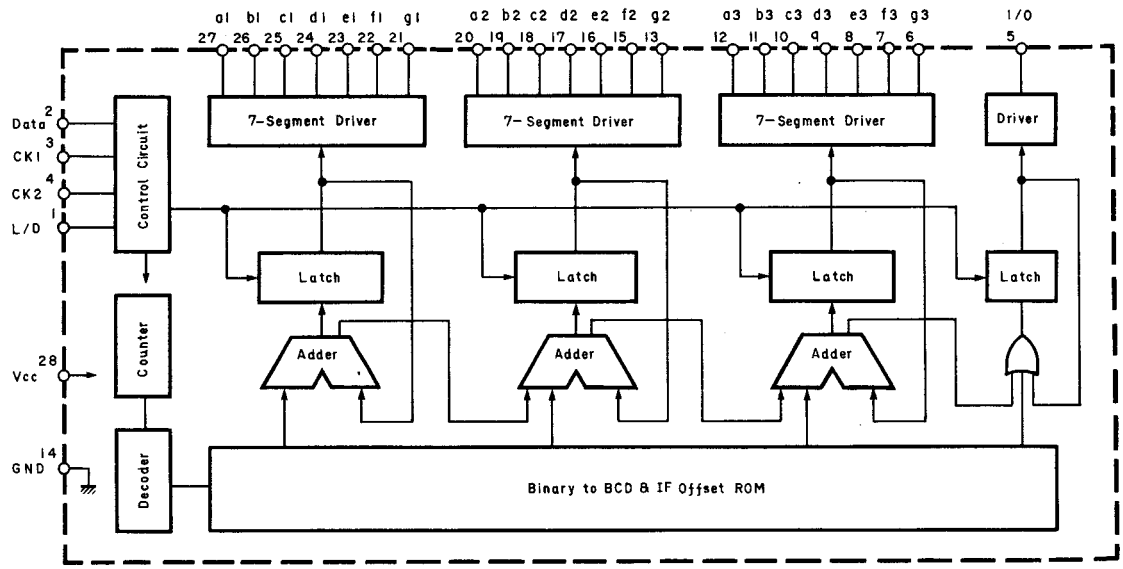


Fig. 6.1.15 Indicator Driver IC TD6301A

6.2. Schematic Diagram

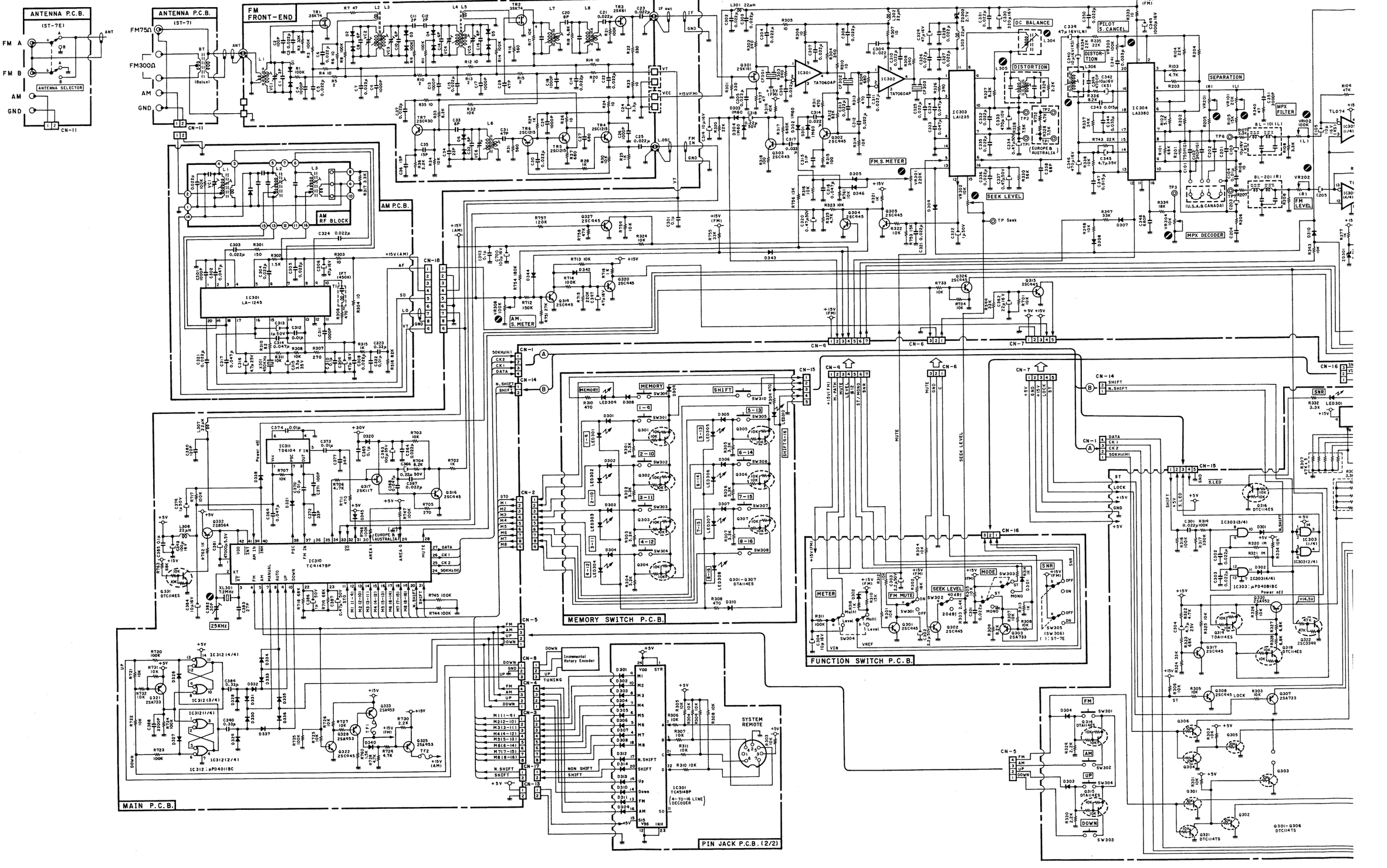
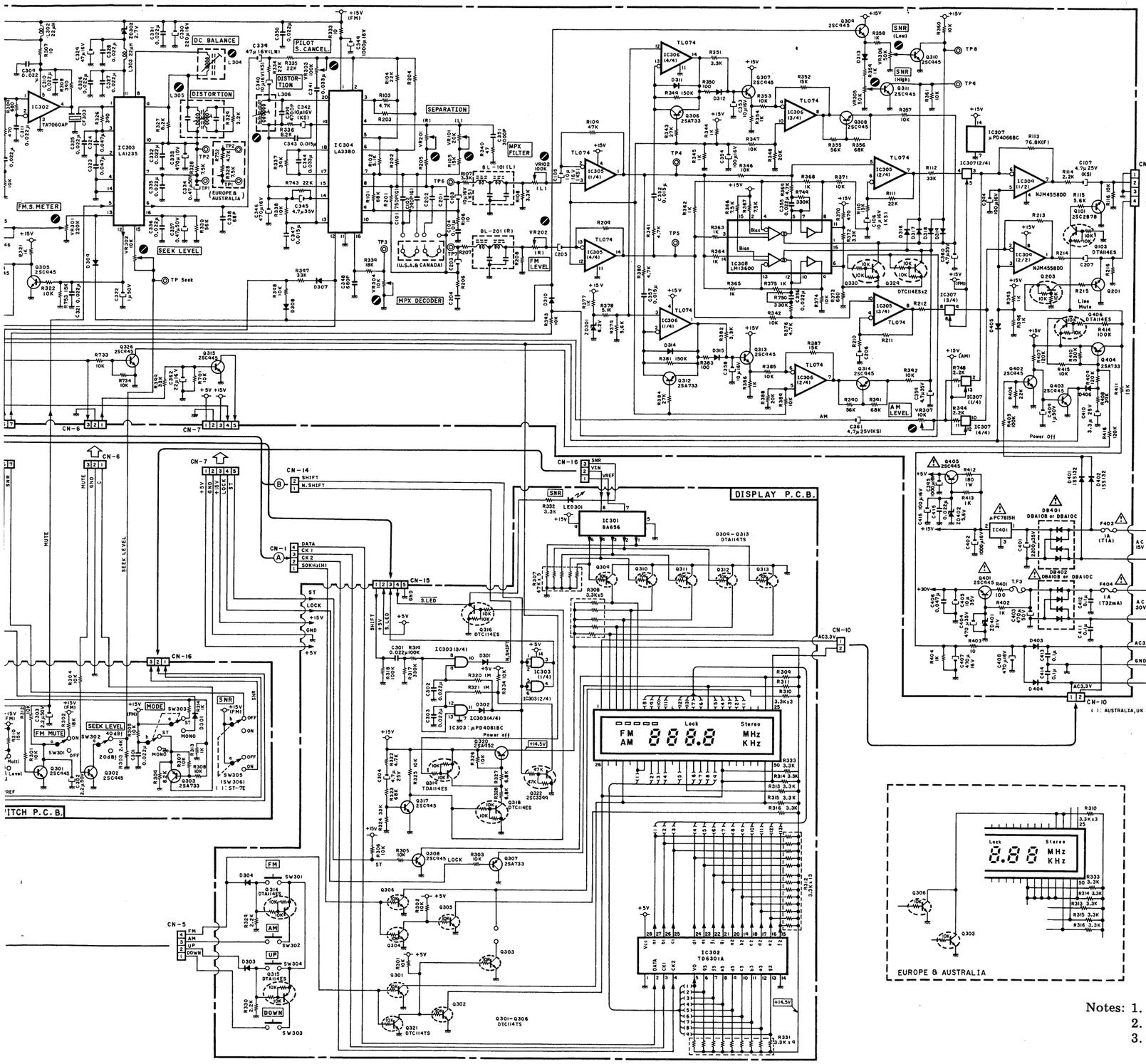
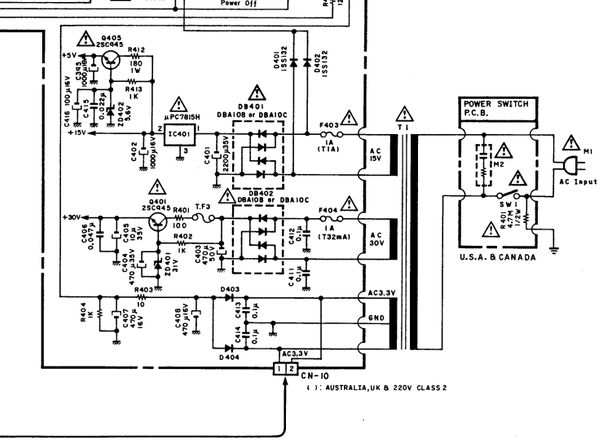
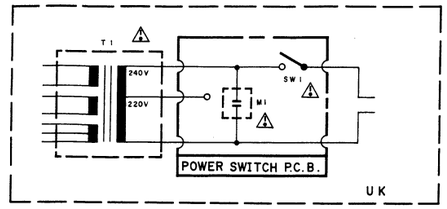
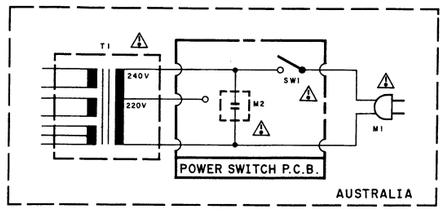


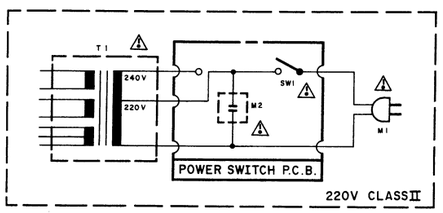
Fig. 6.2











Warning:

Parts marked with the symbol ⚠ have critical characteristics.
Use ONLY replacement parts recommended by the manufacturer. It is recommended that the unit be operated from a suitable DC supply or batteries during initial check-out procedure.

Caution:

Before returning the unit to the customer, make sure you make either (1) a leakage current check or (2) a line to chassis resistance check. If the leakage current exceeds 0.5 milliamp, or if the resistance from chassis to either side of the power cord is less than 240 k ohms, the unit is defective. WARNING — DO NOT return the unit to the customer until the problem is located and corrected.

Notes: 1. Diode is 1SS53, 1S1555, or 1SS176 unless otherwise specified.
2. 2SA733, 2SA608SP, 2SA1048 and 2SA1175 are interchangeable with each other.
3. 2SC945, 2SC536SP, 2SC2458 and 2SC2785 are interchangeable with each other.

7. WIRING DIAGRAM

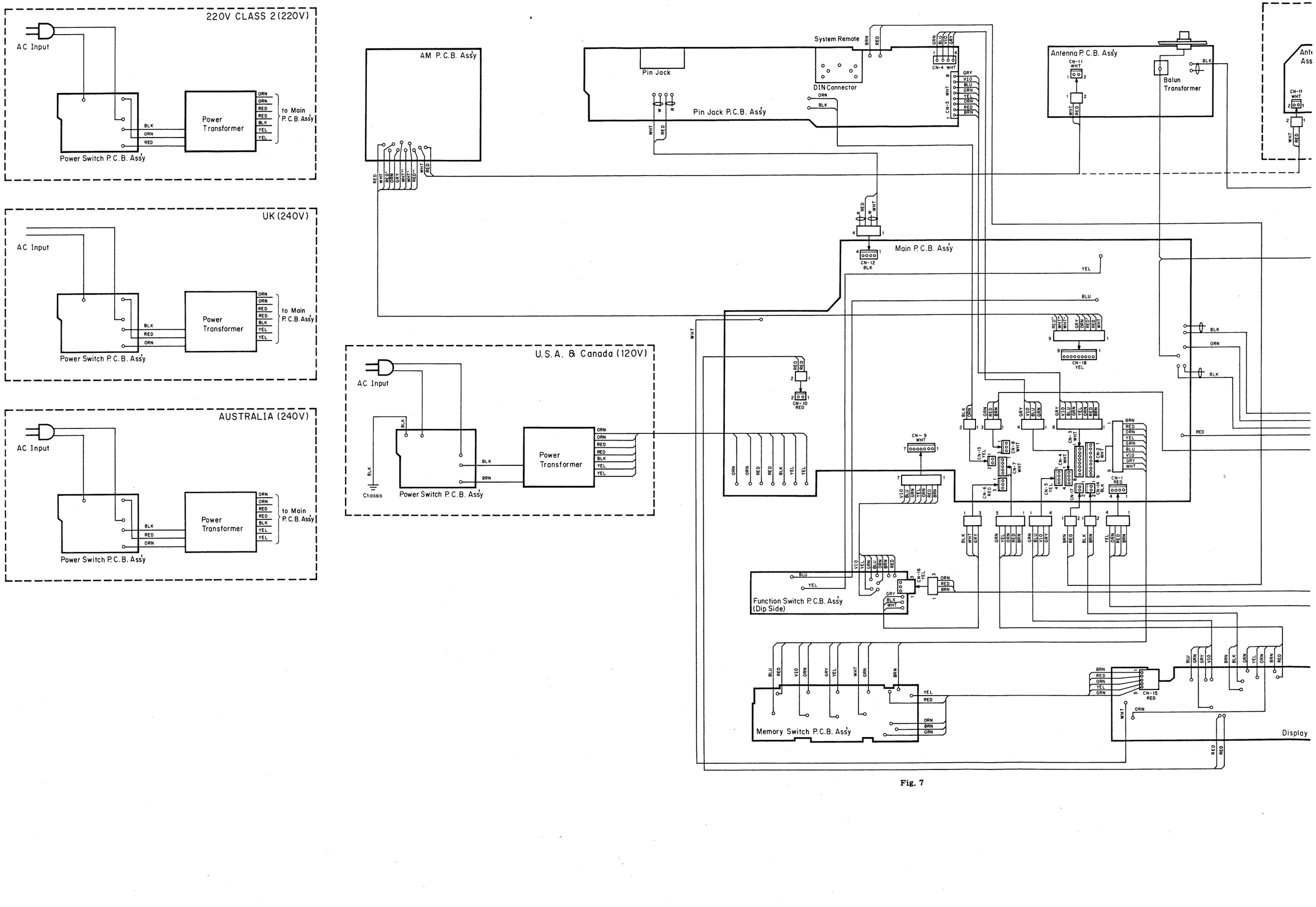


Fig. 7

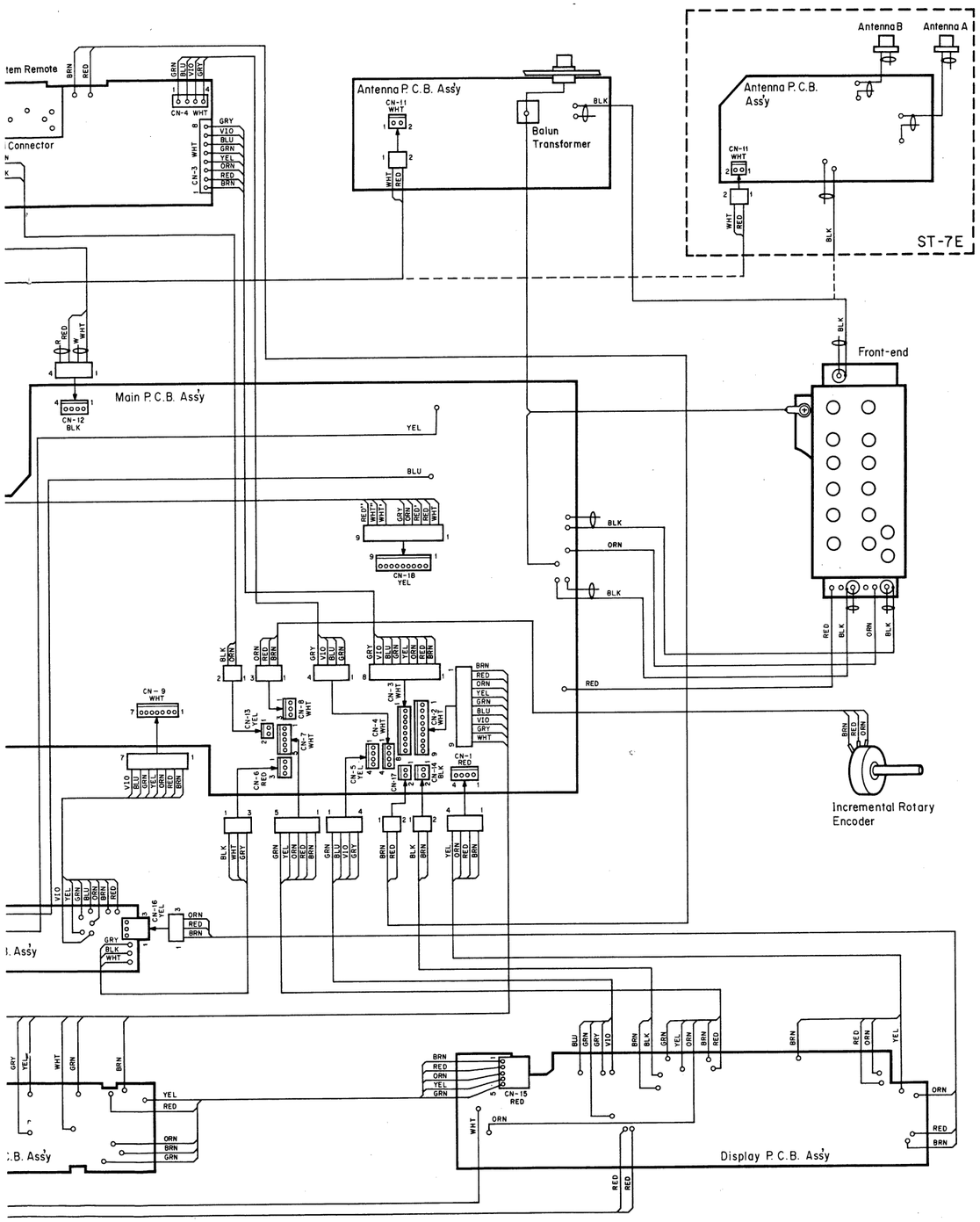


Fig. 7

Notes: 1 Table of wire colors

BRN — Brown	BLU — Blue
RED — Red	VIO — Violet
ORN — Orange	GRY — Gray
YEL — Yellow	WHT — White
GRN — Green	BLK — Black

2. Component side view of the P.C.B. is illustrated unless otherwise specified.

8. BLOCK DIAGRAM

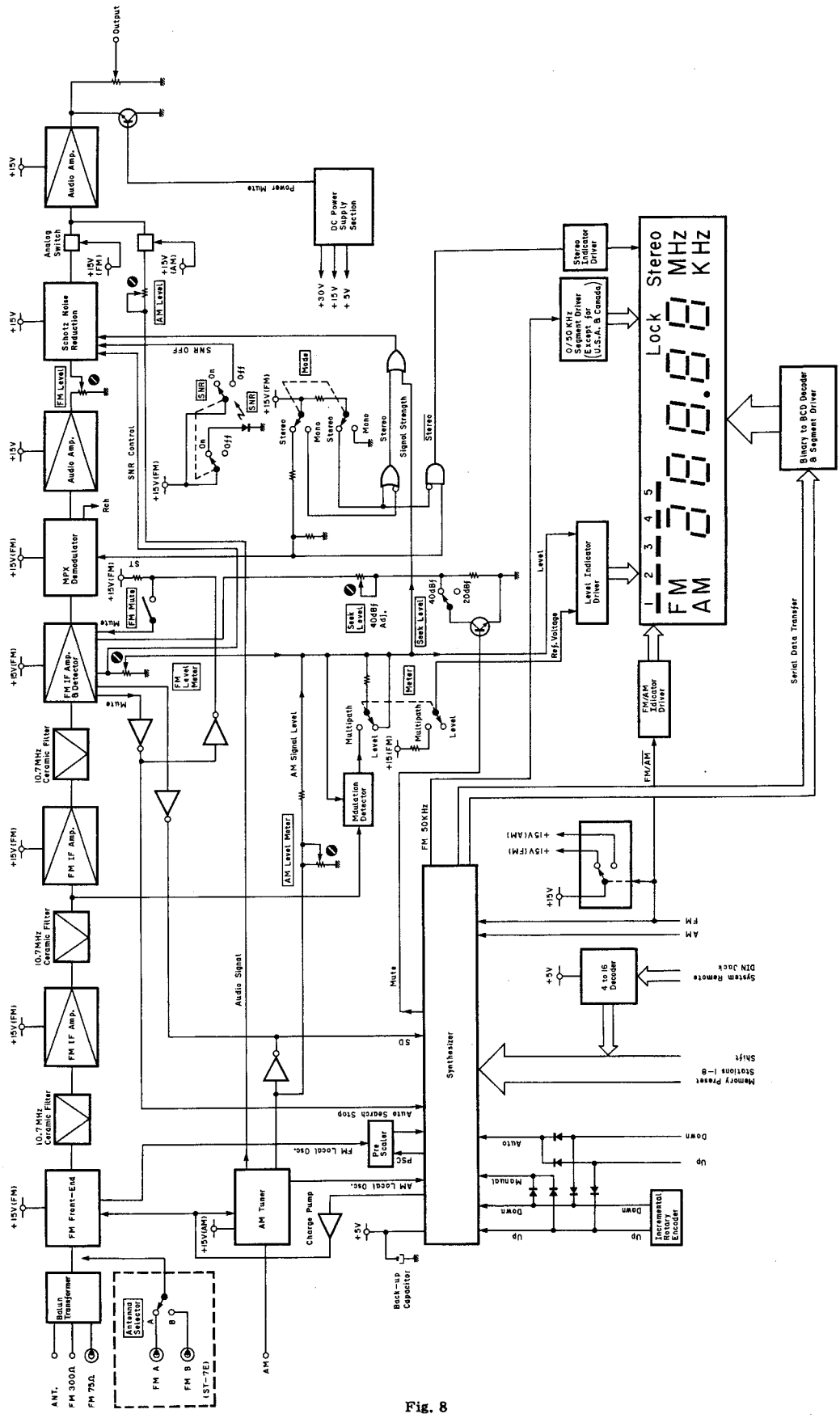


Fig. 8

9. SPECIFICATIONS

[FM Section]

Note • All RF levels in microvolts given in 300-ohm antenna input.
• Modulation: Mono 100%, Stereo Pilot 9%, Stereo Audio Signal 91%

Frequency Range	87.5 — 108.0 MHz in 100 kHz steps
Usable Sensitivity	
Mono	10 dBf/1.7 μV
Stereo (sub)	17 dBf/3.9 μV
50 dB Quieting Sensitivity	
Mono	14 dBf/2.7 μV
Stereo with Schotz NR	28 dBf/14 μV
Stereo without Schotz NR	37 dBf/39 μV
Signal to Noise Ratio	
Mono	Better than 80 dB
Stereo	Better than 76 dB
Schotz NR S/N Improvement	More than 6 dB
Schotz NR Active Level	19 — 53 dBf/5 — 250 μV
High-Blend Threshold Level	19 dBf/5 μV
Muting Threshold Level	20 dBf/5.5 μV
Frequency Response	20 — 15,000 Hz ±1 dB
Total Harmonic Distortion (1 kHz)	
Mono	Less than 0.06%
Stereo	Less than 0.08%
Capture Ratio	1.9 dB
Alternate Channel Selectivity (±400 kHz)	Better than 60 dB
Stereo Separation 100 Hz/1 kHz/10 kHz	50/55/45 dB
Spurious Response Rejection	Better than 100 dB
Image Rejection	Better than 100 dB
IF Rejection	Better than 100 dB
AM Suppression	Better than 60 dB

[AM Section]

Note • Modulation: 400 Hz, 30%

Frequency Range	520 — 1,710 kHz in 10 kHz steps
Usable Sensitivity	50 dB/m
Signal to Noise Ratio (RF input 90 dB/m)	Better than 48 dB
Total Harmonic Distortion (RF input 90 dB/m)	Less than 0.4%
Selectivity (±10 kHz)	Better than 20 dB

[General Specifications]

Output Level/Impedance	
FM (1 kHz, Mono, 100% Modulation)	0.5 — 2.0 V (variable)/1.5 kΩ
AM (400 Hz, 30% Modulation)	0.2 — 0.9 V (variable)/1.5 kΩ
FM Antenna Inputs	75 Ω unbalanced 300 Ω balanced
Power Source	120, 220 or 240 V AC; 50/60 Hz (According to country of sale)
Power Consumption	15 W max.
Dimensions	435 (W) x 63 (H) x 289 (D) mm 17-1/8 (W) x 2-1/2 (H) x 11-3/8 (D) inches
Approximate Weight	4.7 kg 10 lb. 6 oz

- Specifications and design are subject to change for further improvement without notice.
- Schotz Noise Reduction manufactured under license from L.S. Research, Inc., U.S. and foreign patents pending.